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ABSTRACT

The author argues that the effect of tax capitalization on the value of property has been neglected in the judicial and legislative discussion of school finance reform, even though this phenomena may weigh heavily on an equitable solution to the current funding dilemma. He examines theoretical and empirical support for the thesis that if, because of differences in the taxable base, one town levies higher tax rates than a neighboring municipality in order to provide the same quality of public service, and if this difference is expected to prevail over time, then property values in the former community will be depressed relative to the value of identical property in the town where tax rates are lower. Consequently, at least part of the inequity in the current system of funding local services will be eased through tax capitalization. This analysis indicates that greater property wealth per pupil results in a lower price for education and this lower price in turn leads to greater per pupil spending. To credit property-based differences and the underlying price differences as the primary source of spending disparities across towns is simply incorrect. The evidence suggests that income differences across towns are more important than price differences. (Author/IRT)

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SCHOOL FINANCE REFORM: THE EQUITY AND EFFICIENCY IMPLICATIONS OF CAPITALIZATION AND TAX-PRICE CHANGES IN CONNECTICUT

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by

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PREFACE

Important public policy issues are sometimes resolved in the political arena - often with emotional overtones - on the basis of conventional wisdom and traditional beliefs. The traditions tend to remain untested, and the wisdom accepted without much question. Such an issue is School Finance Reform in Connecticut, with its accompanying focus on real property tax burdens from town to town.

While School Finance Reform is a fiscal matter with strong elements of distributive equity, it does impinge upon the field of real estate. That is why this volume and the research upon which it is based have been sponsored and supported by the Center for Real Estate and Urban Economic Studies. The direct and immediate impact of any likely program of School Tax Reform in Connecticut will fall on the real property tax. This, in turn, will have an influence on property values, land use decisions, and locational decisions of both households and businesses.

Much of the conventional wisdom in vogue about the incidence and burden of real property taxes, and about the measurement of local community "effort" to support public education, stems from traditional notions about real property value(s) as "wealth". The real property tax base is widely regarded as the appropriate standard for measuring a community's ability to sustain its education budget. Comparisons among towns are made on this basis. Moreover, tax reform proposals in the Connecticut General Assembly have used this measure as their point of departure, in response to the judicial mandate of *Horton v. Meskill*.

Applying penetrating and objective economic analysis - the measures of the market place - Dr. McEachern's timely study puts much of this conventional wisdom to the test of applicability and practicality, and finds it wanting. He notes important alternative measures for developing a system of School Finance Reform. He tests the largely unexplored area of capitalization of property tax differentials. By removing preconceptions about "wealth" and ability to pay, and especially about differences in those measures from town to town, he places the School Finance Reform issue in its proper judgmental context - for Connecticut, at least.

Dr. McEachern's analytical conclusions are manifestly useful and supportable. His policy recommendations and judgments are of course his own, and do not necessarily reflect the views of the Center for Real Estate and Urban Economic Studies. CREUES is pleased to make this important and useful study available to help in the rational resolution of a highly significant public policy issue.

Storrs, Connecticut
December 1977

William N. Kinnard, Jr.
Director

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Storrs, Connecticut
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CHAPTER 1

INTRODUCTION

During the last 10 years the current system of financing primary and secondary education has been the focus of increasing controversy. Court cases challenging the constitutionality of current patterns of financing education have been argued in nearly 40 states and have gone to the U. S. Supreme Court. The United States Senate's Select Committee on Equal Educational Opportunity has held hearings producing mountains of statements and documents totaling nearly 10,000 pages.[1] The U. S. Office of Education has funded research leading to a series of volumes produced by the National Educational Finance Project.[2] In addition, a number of states have begun evaluating their own financing systems.[3] At least part of the current interest in educational research reflects the growing dissatisfaction with the use of the property tax for funding primary and secondary education. The differences in revenue-raising ability across towns were dramatized in 1971 with the *Serrano v. Priest*[4] decision in California. Although the U. S. Supreme Court in *Rodriguez v. San Antonio*[5] ruled in 1973 that the Federal Constitution does not describe education as a "fundamental right," the state courts have taken a closer look at their own statutes and constitutions. In view of the Rodriguez decision, *Serrano v. Priest* was once again tried in the California Supreme Court and found to be in violation of that state's constitution.[6] Since the Rodriguez decision, more

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[1]United States Senate, Select Committee on Equal Educational Opportunity Hearing (Washington, D. C.: U. S. Government Printing Office, 1971).

[2]Roe L. Johns, et al. (Ed.), Economic Factors Affecting the Financing (Gainesville: National Education Finance Project, II, 1970).

[3]For example see: New York Commission on the Quality, Cost and Financing of Elementary and Secondary Education. (New York: Fleischman Commission, various reports, 1968-1972).

[4]*Serrano v. Priest*, 938254, L. A. 29820 (California Supreme Court, 1971).

[5]*Rodriguez, et al., v. San Antonio*, Independent School District, et al, 377 F. Supp. 280 (W.D. Tex, 1972).

[6]"Serrano v. Priest." U. S. Law Week (January 25, 1977), pp. 2340-2341.

than 19 states have passed major school financing reforms and eight others have assumed a larger state share of funding.[7]

The basic problem, as viewed by the courts, is that a town's ability to finance education is not so much a function of the town's property tax rate, but of the town's property wealth. Wealthier towns are able to spend more on education using a lower tax rate than poorer towns. The courts have pointed out these discrepancies across towns and have asked state legislatures to adopt reforms to provide greater equality in school financing.

Here in Connecticut, there have been two studies of educational finance sponsored by the State[8] plus a third study funded by the Connecticut Education Association.[9] Each study has pointed to the wide disparity in the property base per pupil across Connecticut's towns and the consequent difference in each town's taxing ability. To correct for this disparity these studies have called for various degrees of State intervention, ranging from modestly revising the student-aid formula to a complete take-over of local school financing, requiring massive infusion of new revenues. Some plans simply call for dividing existing property tax revenues differently so that a portion of property taxes raised in the wealthier towns is transferred to the poorer towns.

The findings of this earlier research, particularly the study entitled Financing Connecticut's Schools[10] played a major role in the case of *Horton v. Meskill*[11] decided in Hartford County Superior Court in December of 1974. In his decision, Judge Jay Rubinow ruled that it is the State's Constitutional duty to educate its children. This duty can be delegated to the towns only if this is deemed "appropriate." But, he argued, the current system is not appropriate. The State Supreme Court recently upheld this decision, noting that financing public schools largely from property taxes was unconstitutional because it denied equal educational opportunities to

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[7]Lawrence Fellows, "Connecticut High Court Invalidates Property Tax for School Financing." New York Times (April 18, 1977), p. 1.

[8]Financing Connecticut's Schools (Hartford: Commission to Study School Finance, State of Connecticut, January 1975) and Local Government: Schools and Property (Hartford: The Governor's Commission on Tax Reform, II, December 1972).

[9]John J. Callahan, Jr. and William H. Wilken, Revision, Relief and Redistribution of the Connecticut State and Local Tax Structure. (Hartford: Connecticut Education Association, 1972).

[10]Supra, note 8.

[11]For more information on this decision see *Horton v. Meskill*, Connecticut Law Journal (February 11, 1975), pp. 19-24.

children from poorer districts.[12] Largely in response to this decision, the State General Assembly approved a modestly-funded school finance reform measure designed to increase the revenue-raising ability of the low-property-base towns.

But in spite of the voluminous literature in the area of educational finance reform, there has been one aspect of the problem that has been largely ignored, particularly by policy makers. The effect of tax capitalization on the value of property has been neglected in the judicial and legislative discussion, even though this phenomena may weigh heavily on an equitable solution to the current funding dilemma.[13] There is both theoretical and empirical support for the thesis that if, because of differences in the taxable base, one town levies higher tax rates than a neighboring municipality in order to provide the same quality of public service, and if this difference is expected to prevail over time, then property values in the former community will be depressed relative to the value of identical property in the town where tax rates are lower. Consequently, at least part of the inequality in the current system of funding local services has been eased through tax capitalization, since an individual moving into a locality with high tax rates and low levels of public service will pay less for a house (or house lot) than for an identical piece of property in the locality with low taxes and high levels of public service. Recent court decisions calling for educational finance reform will likely result in property appreciation in the aided towns and in property depreciation in the unaided towns. Moreover, if the "winners" and "lossers" by income class are examined, the beneficiaries of reform are not necessarily those who the courts and state legislatures had in mind when the reform was introduced.

There have been a number of recent studies examining the extent of property tax and public expenditure capitalization for various samples

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[12]"*Horton v. Meskill*, Connecticut Supreme Court." The United States Law Week (May 3, 1977), pp. 2509-2510.

[13]Within the last few years several authors have discussed various aspects of fiscal capitalization (See Bibliographic Reference Nos. 8, 26, 30, 46 and 62). Perhaps the most comprehensive and perceptive research to date is by Robert L. Bish, "Fiscal Equalization Through Court Decisions: Policy-Making without Evidence." *The Delivery of Urban Services: Outcomes of Change* (Elinor Ostrom, Ed.), Sage Urban Affairs Annual Review, 10, (1976), pp. 75-102 and Robert L. Bish and Hugh O. Nourse, Urban Economics and Policy Analysis (New York: McGraw Hill Book Company, 1975). Bish examines some otherwise neglected issues of efficiency and equity. The bulk of this present research was completed before most of the above studies were either published or came to the author's attention. Parts of this study have been revised in light of these contributions. This revision was influenced primarily by the work of Bish.

drawn from state and metropolitan areas.[14] Much of this research has been aimed at testing a variation of the Tiebout Hypothesis,[15] which argues that consumers, in shopping for communities in which to live, will compete for more attractive towns and consequently capitalize any fiscal advantages among towns. The usual approach involves explaining differences in median housing values across towns using, in addition to fiscal variables, a number of locational and structural factors. The objective is to isolate the marginal contribution of taxes and public expenditures to the value of housing. The results of this research appear to vary based on the geographical sample, with the most extensive capitalization occurring in metropolitan areas[16] and the least capitalization taking place in more rural areas.[17] Apparently, the supply of housing is less elastic in urban areas so that fiscal differences become more fully capitalized in existing property. None of this research has focused on the school finance reform issue.

The second chapter of this paper will develop a simple theoretical model to demonstrate the effects of capitalization of fiscal variables, particularly in the context of school finance reform. This is a long but an important chapter. Past empirical work examining the capitalization phenomenon will be reviewed in Chapter 3. Because this evidence suggests that the extent of capitalization may differ from region to region and because none of this research has linked the capitalization issue to school finance reform, some implications of the model developed in Chapter 2 will be tested in subsequent chapters using a sample of Connecticut towns. The empirical specification of the capitalization model and predicted hypothesis will be discussed in Chapter 4. The test results will be presented in Chapter 5. Several other implications of the model will be tested in Chapter 6, including estimating the price and income elasticity of the demand for education. In Chapter 7 some equity and efficiency implications of current funding patterns in Connecticut will be discussed in view of the evidence. The recent school finance reform measure passed by the Connecticut General Assembly will be evaluated in Chapter 8. The final chapter will briefly summarize the results and discuss the main conclusions. The sample of towns employed in the study plus a fuller description of data sources are provided in the Appendix.

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[14]See Bibliographic References Nos. 12, 30, 28, 32, 36, 37, 41, 49, 52, 56, 57, 58, 59, 64, 67, and 73.

[15]Charles Tiebout, "A Pure Theory of Local Expenditures." Journal of Political Economy, 64 (October 1956), pp. 416-424.

[16]Supra, note 14, Nos. 12, 20, 28, 52, 56, and 67.

[17]Supra, note 14, Nos. 36, 37, and 64.

CHAPTER 2

CAPITALIZATION MODEL

This chapter will begin with the assumptions underlying the model and proceed to explain patterns of tax and expenditure capitalization consistent with traditional consumer theory. It is assumed at the outset that each resident divides his expenditures among housing, education and some composite for all other goods. Each resident desires a level of school spending that maximizes his utility subject to his own budget constraint. Utility maximizing behavior implies that, within a particular community, the educational expenditure level desired by each resident will depend on his income, his share of the cost of education (the tax-price), and his preferences for education.

Since the choice of school spending levels within a community is a collective choice, this study will employ the majority-rule, median-voter assumption. This assumption holds that the community's effective demand for education is that quantity demanded by the voter desiring the median amount of education.[18] This assumption reconciles the voters' varied demands into a single community demand function.

Consider two residential communities, Town A and Town B. To facilitate inter-town comparisons some simplifying assumptions will be made. Assume the median voters in each town own identical homes which have identical market values and which are of average value for homes in each town. Moreover, assume these median voters have similar income and taste for education. Though it is not essential for the model, for simplicity assume that each town has the same number of homes with each home enrolling on average one student in the public school system. Finally, assume at the outset that education is the only public good provided by the public sector and all local taxes are drawn from property taxes.

A. Price of Education

If total outlays for education are to be raised by $1.00, then the cost to the ith household is that $1.00 times the fraction of total town taxes paid by this household. The fraction of taxes paid is directly related to the fraction of

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[18]Duncan Black, "On the Rationale of Group Decision Making." Journal of Political Economy, 56 (February 1948), pp. 23-24. Black has shown, under some fairly general assumptions, that the median voter's preferred budget is the only one that will win at least a majority of the votes when paired against any other budget. This assumption has been employed extensively in public finance analysis. See also Bibliographic References Nos. 5, 9, 33, and 45. The author examined the local debt choice (Bibliographic Reference No. 45) and Holcombe (Bibliographic Reference No. 33) viewed the choice of education expenditures. In both instances the assumption's implications were confirmed.

property wealth represented by this household, or $V_i / \sum_{i=1}^{n} V_i$, where V_i is the value of the ith household and the denominator is the total value of the n homes in the town. (Because this is a residential community, assume for the present there is no commercial or industrial property.) Hence, the cost to the ith household of raising total outlays by $1.00 is

$$\$1.00 \times \frac{V_i}{\Sigma V_i}$$

The cost of raising per pupil spending by $1.00 is the total cost times n, the number of students, or

$$\$1.00 \times \frac{V_i}{\Sigma V_i} \times n$$

This can be simplified to $nV_i/\Sigma V_i$, which is, in effect, the price to the ith household of raising per pupil expenditures by $1.00. Note that across taxpayers the tax price of education will differ. The higher the value of the home, the higher the tax price.

For the median voter the price will be $nV_m/\Sigma V_i$, where V_m represents the value of the median voter's home. Since by assumption this home is of average value for the town, then $\Sigma V_i = nV_m$. Consequently the price facing the median voter is $nV_m/nV_m = \$1.00$, and the price facing other voters is $nV_i/nV_m = V_i/V_m$. So homes of above average value pay prices exceeding $1.00 and homes of below average value pay less than $1.00 for each $1.00 of per pupil spending.[19]

The median voters in each town face identical prices of $1.00. This identical price coupled with earlier assumptions concerning equal tastes and incomes will result in an equal amount of education demanded in each town. Allow E_t to represent the level of per pupil spending in year t selected by the median voter in each town. Since the price of education per pupil for the median voter is $1.00 per $1.00 of spending, his total taxes must just equal per pupil spending. Based on this information the value of the home owned by the median voter can now be determined.

B. The Value of Housing

The present or market value of a home is determined by the discounted value of housing services flowing from the home plus the discounted value of public expenditures in the town minus the discounted value of taxes that must be paid. For the median voter the present value of the home is

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[19] More generally, if the number of homes and students differs, then the price to the ith household is nV_i/hV_m, where h is the number of homes. And the price facing the median voter is n/h.

$$V_m = \sum_{t=1}^{y} \frac{H_t + \alpha E_t - \beta s_t V_m}{(1 + R)^t} \qquad (2.1)$$

where: H_t = value of housing services in year t.

E_t = per pupil education expenditures in year t.

s_t = school property tax rate in year t.

r = discount rate; appropriate return on an investment of comparable degree of risk and liquidity (assumed to be constant for all t).

α = capitalization coefficient of school expenditures, where $\alpha \geq 0$.

β = capitalization coefficient of property taxes, where $\beta \geq 0$.

Note that the coefficients α and β allow public expenditures and taxes to be valued at either above or below their actual amount. For example, if there is a consumer surplus in the purchase of education, then α will exceed one. Since expenditures per student equal taxes (or $E_t = s_t V_m$) for the median voter, the public sector will cancel out of the equation only when $\alpha = \beta$. Otherwise the public sector could either subtract from or add to the value of the house.[20] If it is assumed that the flow of housing and school expenditures remains constant indefinitely, then Equation (2.1) reduces to

$$V_m = \frac{H + \alpha E - \beta s V_m}{r} \qquad (2.2)$$

Thus far each town has been viewed as strictly residential. A major source of interjurisdictional differences in the property base across towns arises from differences in the concentration of commercial and industrial property.[21] Assume that a major industrial enterprise (an enterprise that yields more in property tax revenues than it requires in terms of municipal services, thereby generating a fiscal residual) locates in Town A, and assume that because of zoning or other restrictions, the supply of housing in Town A is fixed. In effect, the prices of education facing the voters in Town A have declined because school taxes can now be spread over a larger base. As a result of this

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[20]Since the median voter to a large extent can have his way in the town, it seems doubtful that he would choose a level of spending that will on net subtract value from his home. Rather than assuming α and β are parametrically given, it would be more realistic to allow them to vary with the level of school spending and taxes; but, at least over the limited range of values that E and sV will take on in this analysis, the constant-value assumption is not totally unreasonable. Later in the analysis this assumption will receive greater scrutiny.

[21]Robert D. Reischauer and Robert W. Hartmann, Reforming School Finance (Washington, D.C.: The Brookings Institution, 1973), p. 41.

lower price, homeowners in Town A can now choose a higher level of school spending, a lower tax rate, or both. Ignoring for the present any industrial externalities, this advantage will make the homes in Town A more attractive; depending on the tax and public spending capitalization coefficients, this advantage will increase their value.[22]

Because of this expanded tax base, the price of per pupil spending confronting the median voter will decrease from \$1.00 to

$$\frac{nV_m^a}{\Sigma V_i^a + M}$$

where the superscript "a" denotes the revised value of the homes in Town A, and M represents the market value of the new industry. As long as M is positive the new price will always be less than one.[23] The actual change in per pupil spending resulting from this lower price will depend, of course, on the price elasticity of demand. Assume here only that this elasticity is less than zero so that the lower price does result in increased spending. In particular per pupil spending goes from E to E_a and total school taxes collected in the town will be

$$nE_a = s_a (\Sigma V_i^a + M) \qquad (2.3)$$

where s_a is the new school tax rate.

But Town A must also provide certain municipal services to the industrial property; consequently, there will be a municipal service tax and tax rate as follows:

$$F = k (\Sigma V_i^a + M) \qquad (2.4)$$

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[22]Often it is the case that a suburban town will attract an industry yet zone out its employees. The new industry could be viewed as a largely capital intensive operation, such as a power plant with modest labor requirements.

[23]If the number of students and homes is identical then it is easy to see that $\frac{nV_m^a}{nV_m^a + M} < 1$. If the students and home numbers differ, then the price drops from n/h without the industry to $\frac{nV_m^a}{hV_m^a + M}$ and it is easy to see that $n/h > \frac{nV_m^a}{hV_m^a + M}$. It will be shown later that the post-capitalization value of the home owned by the median voter will still be of average value for homes in the town.

where F is assumed to be the constant annual cost of services rendered the industry, and k is the municipal service tax rate. From Equations (2.3) and (2.4) total spending and taxes are

$$nE_a + F = (S_a + k)(\Sigma V_i^a + M) \tag{2.5}$$

Since $\Sigma V_i^a = nV_m^a$, the solution for the taxes paid by the median voter can be determined. Dividing the entire expression by n and rearranging terms yields

$$V_m^a (s_a + k) = E - \frac{1}{n}[M(s_a + k) - F] \tag{2.6}$$

The expression in brackets represents taxes raised from the industry minus municipal service outlays; this is the total fiscal residual generated by the industry. The average homeowner's share of that residual is his fraction of total residential property, or 1/n.[24] Thus the taxes paid by the median voter amount to per pupil spending minus his share of the fiscal residual.[25]

The median voter's taxes and the per pupil spending level can now be substituted into the initial valuation Equation (2.2) to express the post-industry capitalized value of the home as follows:

$$V_m^a = \frac{H + \alpha E_a - \beta\left[E_a - \frac{M(s_a + k) - F}{n}\right]}{r} \tag{2.7}$$

and the difference between the initial and the revised value of the median voter's home can be found by subtracting Equation (2.2) from (2.7) yielding

$$V_m^a - V_m = \frac{\alpha(E_a - E) + \beta\left[E - E_a + \frac{M(s_a + k) - F}{n}\right]}{r} \tag{2.8}$$

Equation (2.8) suggests that the home value may fluctuate for two reasons: the first involves the changes in the level of per pupil spending and the second reflects changes in taxes. The first expression on the right hand side represents the capitalized effect of any increase in per pupil spending. The

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[24]Similarly the ith homeowner's share of the residual is $V_i^a / \Sigma V_i^a$.

[25]If for some reason this residual is negative, then the value of the home in Town A will decline. For the homeowners in Town A to reap the entire fiscal residual, the supply of housing in the town would have to be perfectly inelastic. In other words, this home (or this town) could not be easily reproduced. If additional housing were constructed in the town as a result of the industrial move, then the owners of house lots would capture part of this residual, and the share apportioned to the initial homeowner would be diluted. Obviously, zoning restrictions and development fees represent a means of exclusions.

bracketed term accounts for any net change in the homeowner's tax liability; if revised per pupil spending, E_a, is less than the sum of the former spending level, E, plus the voter's share of the residual, then his taxes are lower than before and this difference will represent a source of capital appreciation. If the new level of school spending exceeds this sum, then taxes will be higher. In short, if the price elasticity of demand is unity, the bracketed term will go to zero (since the median-voter will continue to tax himself the same amount as before). If the elasticity exceeds one, then taxes will be greater than before; if less than one, taxes will be less. The effects of capitalization will differ between homes of above and below average value. These differences will be discussed later in the context of education finance reform.

From Equation (2.7) it is observed that an increase in the expenditure capitalization coefficient (α) or an increase in the value of the enterprise (M), will increase the difference between the old and revised value of the home; conversely, an increase in maintenance costs (F) or the discount rate (r) will decrease this difference. The impact of a change in β will depend on the sign of net tax changes.

Note that after capitalization occurs, homes in the two towns are equally attractive. Any attraction that the home in Town A had as a result of the lower price of education has been negated through its higher price. At the margin the prospective home buyer will be indifferent between locating in Town A with the lower tax-price but higher housing cost or locating in Town B with the higher tax-price but lower housing costs. The industrial location has conferred windfall gains on the owners of property in Town A, but subsequent property buyers in the town are no better off than were the citizens of Town A before the industrial move, or than are the citizens of Town B.[26]

In reality, industrial development takes place over decades. If different towns with a different tax base and different tax price are observed, it cannot be said that people in one town are necessarily better off, because any advantage that one town had over the other towns was paid for through higher property prices. Of course, some of the original windfall recipients may still be around, but it is likely that many have moved on or passed away. As Hamilton recently noted, "If differential fiscal surpluses are capitalized into demand curves for property, there can be no horizontal inequity in a static world."[27]

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[26]The example assumes that the value of the home in Town B does not change after the move. This implies that the demand for housing in Town B remains unaffected by the industrial move to Town A (i.e., that homes are sold in perfectly competitive markets). If the increased demand for housing in Town A results in a decrease in demand for housing in Town B, then the market value of housing in Town B will accordingly fall. However, even with a lower value of housing in Town B, the equilibrium would still be reached at a point where homes in each town are equally attractive.

[27]Hamilton, "Capitalization of Intrajurisdictional," p. 744.

C. Judicial Reform

As has been noted, the courts have looked at the differing property bases across towns and have called for efforts to equalize effective property base per pupil across towns. Reforms have included equalizing the revenue-raising ability across towns either through state aid or through redistributing property tax dollars from "wealthier" to "poorer" towns. (The objective is to provide "poorer" towns with a lower tax price for education and thereby stimulate school spending, providing for greater equality in education.) These reforms will have capitalization effects which will, in part, undermine the intent of the legislation.

In order to illustrate these capitalization effects, assume that it now becomes a state policy to ensure that all towns have an equal ability to provide education, and this policy is reflected in an equalized effective property base per pupil. Initially a subsidy is to be financed by some revenue source unrelated to housing consumption. In this case, the poorer Town B will be subsidized to bring its revenue-raising ability for any given school tax rate up to that of Town A. The annual grant under this "power equalization" formula will be equal to the school tax rate selected in Town B times the difference between the property base in each town. But the process of indefinitely subsidizing school spending in Town B will cause the value of the home in that town to rise, since now this education can be provided at a lower "price." Rather than use the initial value of housing, ΣV_i, in the grant formula, the post-subsidy value of housing, ΣV_i^b, reflecting the capitalized value of the subsidy will be employed.

The total grant, G, to the town under these conditions is the school tax rate in Town B, s_b, times the difference in the property base per pupil times the number of pupils. Since there are n students in each town, the expression for state aid simplifies as follows:

$$G = s_b \left[\frac{\Sigma V_i^a + M}{n} - \frac{\Sigma V_i^b}{n}\right] \quad n = s_b (\Sigma V_i^a + M - \Sigma V_i^b) \qquad (2.9)$$

Note that the post-transfer value of property is used for Town B. The total taxes paid by the town are total school spending, nE_b, minus state aid. The taxes paid by the ith homeowner are total taxes times the ith property as a fraction of total property, or

$$T_i^b = \frac{V_i^b}{\Sigma V_i^b} [nE_b - s_b (\Sigma V_i^a + M - \Sigma V_i^b)] \qquad (2.10)$$

And since the median voter has a home of average value then $V_m^b / \Sigma V_i^b = V_m^b / nV_m^b = 1/n$, so that his taxes are

$$T_m^b = E_b - s_b (V_m^a + \frac{M}{n} - V_m^b) \qquad (2.11)$$

This tax figure, along with the new school spending figure, E_b, may be plugged into the initial valuation formula to yield the newly-capitalized value of property, and the initial value of property can be subtracted to find the difference between pre- and post-reform housing values. The result is

$$V_m^b - V_m = \frac{\alpha(E_b - E) + \beta[E - E_b + s_b (V_m^a + \frac{M}{n} - V_m^b)]}{r} \qquad (2.12)$$

As with the earlier discussion involving capitalization in Town A, the first expression on the right-hand side represents capital appreciation due to increased school spending and the second expression represents net changes between the former and present tax liability. The earlier discussion regarding price elasticity and changes in tax liability apply here as well.

From Equation (2.12) it is observed that as long as α is constant across homes of different valued property, the first expression, $\frac{\alpha(E_b - E)}{r}$, will be the same for all homeowners regardless of the value of housing.[28] Changes in the tax liability will differ with the value of the home. Specifically, all properties will appreciate by the same absolute amount due to increases in school spending; this will represent a proportionately larger amount of the market value for lower-valued properties than for higher-valued properties. Consequently, the lower-valued properties will appreciate proportionately more than higher-valued properties. The more this lower tax-price stimulates increases in school spending, the proportionately greater are the benefits to poorer properties. For example, if the price elasticity of school spending is unity, then taxes for the average homeowner will remain the same as before and all school aid will pour into school spending. While all homes will appreciate, in this case, the lower-valued homes will increase proportionately more.[29]

As the price elasticity of the demand for education approaches zero, more and more of the school aid will go toward tax reductions and less to spending increases. There will tend to be less capital appreciation attributed to increases in school spending and more due to reductions in taxes. If the value of

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[28]At first one might think that α should be greater for lower-valued homes since the owners of these homes pay lower tax-prices and are, therefore, likely to reap a greater consumer surplus in the consumption of education. Owners of lower-valued homes are also likely to have lower incomes and therefore may have less demand for education. To some extent this will offset the additional consumer surplus available to residents facing lower tax-prices.

[29]There is one complicating factor which will partially offset capital gains for lower-valued properties. Since the tax liability of any home can be traced to the value of that home as a fraction of total property value in the town, then because the value of the lower-valued home increases proportionately more than other homes, its value relative to the total value of housing will increase, and consequently so will its relative tax share. Conversely, the relative tax share of what initially were more expensive homes will decline.

β can be assumed to hold across properties of different value, then the percentage increase in property values will tend toward equality for all properties.[30]

The two essential findings are that educational spending will benefit all properties equally regardless of the relative value of the home. First, poorer homes will appreciate proportionately more than richer homes, to the extent that state aid results in higher school spending. Secondly, all homes will tend to experience the same proportionate increase in property values, to the extent school aid serves simply to reduce property taxes. In short, the greater the elasticity of demand for education, the more lower-valued homes will benefit; the nearer zero it is, the more all homes will benefit proportionately.

D. Post-Reform Price of Education

The effective tax base per pupil in Town B, after the school finance reform, is equal to the base per pupil in Town A. This is, in fact, the objective of the guaranteed base program--to ensure that Town B can raise the same revenue as Town A with any given tax rate. The price of education and the tax base per pupil, though clearly related, are not identical. In Town A the price of education facing the ith homeowner is $nV_i^a/(\Sigma V_i^a + M)$ and in Town B it is $nV_i^b/(\Sigma V_i^a + M)$.

A major difference between the two towns is that, while both towns have the same effective tax base per pupil, Town A must draw upon that same base to finance outlays to service the industry, but Town B has no such requirement. As a result, the homeowners in Town A pay extra taxes (In terms of the original formulation of Equation (2.5), these taxes amount to kV_i^a); to the extent these higher taxes become capitalized, homes in Town A will be worth less than identical homes in Town B. In terms of the median voter, then $V_m^b > V_m^a$ and the price facing the median voter in Town B is greater than in Town A.

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[30]The amount by which the ith property benefits from any given amount of state aid directly relates to the amount that property value represents as a fraction of the total. Specifically, if G represents the total state grant then the ith homeowner's share of that grant is $\frac{V_i^b}{\Sigma V_i^b} \cdot G$ and the present value of this grant in terms of reduced taxes is

$$\frac{\beta[\frac{V_i^b}{\Sigma V_i^b} \cdot G]}{r}$$

And this amount as a fraction of the value of the house is $\frac{\beta[\frac{V_i^b}{\Sigma V_i^b} \cdot G]}{rV_i^b} = \frac{\beta G}{r\Sigma V_i^b}$

Since all values in the reduced expression are invariant across home values, this fraction is the same for all homes.

Thus, residents of the two towns have an identical effective base, but face different prices. The equalization formula ensures equal tax bases, but ignores other non-school expenditures that must be financed from the same base. The larger the non-school outlays that must be financed from the base, the greater the difference in home values between the two towns.[31]

A way of ensuring that property values for identical homes in each town are equal after the reform is to base the state grant on the fiscal residual in Town A rather than base it on the tax base in that town. From a practical view, the fiscal residual is difficult to observe, whereas the property base per pupil is not.

E. Recapturing Programs

Instead of financing the subsidy through some revenue source unrelated to housing consumption, another alternative that has been employed in the past is to raise the tax rates in the richer town and "capture" this amount to subsidize the poorer town. The objective with this approach is usually to ensure that the revenue-raising abilities in the two towns are equal.[32] These revenue-raising abilities are equalized by setting the school tax rates in each town equally and deriving the transfer from Town A to B which will yield the same net revenue in each town. Or,

$$s(\Sigma V_i^a + M) - G = s\Sigma V_i^b + G \qquad (2.13)$$

where s is the identical school tax rate in each town and G is the grant from Town A to Town B. Solving for G yields

$$G = \frac{s(\Sigma V_i^a + M - \Sigma V_i^b)}{2} \qquad (2.14)$$

As a result of this scheme, Town A transfers to Town B an amount equal to the school tax rate times half the difference in the property base (per pupil) between the two towns. The share of this grant attributable to the average home may be found by multiplying G by the median voter's share of total property value, which is $V_m^b/nV_m^b = 1/n$. The portion of aid reaped by the median voter is then

$$\frac{G}{n} = \frac{S(V_m^a + \frac{M}{n} - V_m^b}{2} \qquad (2.15)$$

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[31]These outlays need not necessarily be of the industrial service variety. Central cities, for example, with heavy commitments toward welfare, police, and fire protection are not strictly comparable to suburbs with no such requirements.

[32]In reality the "recapturing" provisions are not as straightforward as this, since the number and sizes of rich and poor towns will not necessarily be equal. However, the example does capture the essentials of the alternative.

The same methodology used earlier can be employed here to solve for the value of V_m^b and to show how the post-grant value compares to the pre-grant value.

If this transfer were expected to persist indefinitely, then the average home in Town B would appreciate by about half of the appreciation under the state-financed scheme. Conversely, since the subsidy reduces the revenue yield in Town A, the value of the homes in Town A will fall in value by a similar amount. Again, because of the way the program is structured (i.e., it ignores the industrial outlays required in Town A), the total taxes on the home in Town A will exceed those on the home in Town B. When the dust settles, the home in Town B will be worth more than an identical home in Town A if this difference is valued on the market.[33]

If the recapturing scheme is employed it will likely fall hardest on the lower-valued homes in Town A because the higher price of education resulting from the loss of revenue-raising power will lead to less school spending in Town A. Just as school spending increases benefit lower-valued homes proportionately more in Town B, so will spending cuts hurt lower-valued homes proportionately more in Town A. However, it is doubtful that the recapturing method will ever catch on. This simple example shows that both towns are better off with state aid than with recapturing.

F. Influx of More Expensive Homes

Return now to the initial situation in which both towns are identical. If, rather than an industry, homes of greater-than-average value for the town are built in Town A, and if school enrollment patterns for these new homes are the same as for existing homes, then these homes will yield a fiscal residual and in effect will lower the price of education.[34] This will result in capital gains for all prior homes in the town. After capitalization takes place, homes in the two towns will become equally attractive. Homes in Town A have a lower price for education, but a higher housing cost; similar homes in Town B have a higher price for education, but a lower housing cost.

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[33]As with the state-financed plan, a way of ensuring that the resulting housing values in the two towns will be equal is to base the transfer on the fiscal residual rather than property base per pupil. If Town A gives half the industry's fiscal residual to Town B, the homes in the two towns will be equal.

[34]It might be asked at this point why presumably higher income residents would choose to locate in a town in which they would be consuming an amount of housing greater than average, creating a fiscal residual. Shouldn't these prospective home buyers locate in a town where they would be consuming less than the average amount of housing and thereby pay a lower price of education? See Bruce W. Hamilton, "Capitalization of Intrajurisdictional Differences in Local Tax Prices." American Economic Review, 65 (December 1976), pp. 743-754, for an interesting treatment of this point. Hamilton shows, in effect, that differences in selling prices for this home-buyer will make him indifferent between identical homes in two locations.

Assume the courts now dictate that tax-raising abilities should be equalized across towns through either state aid or a recapturing scheme. Since the school tax is the only tax paid[35] and since after the subsidy each town can raise the same revenue with the same tax, then it can be shown that the value of identical homes in each town will be equal and so will be the tax price.

G. Concluding Remarks

The point of this chapter was first to show that any fiscal advantage that homes in one town have over homes in another town will likely be negated through higher price. Also, in equilibrium there will be no horizontal inequity across towns calling for government intervention. (Vertical equity will be discussed in a subsequent chapter.) Residents of towns with more attractive tax loads or public expenditure levels will pay more for that home than for an identical home in a less attractive town.

The courts have observed different "fiscal capacities" and have suggested a number of alternatives, most involving equalizing the effective tax base per pupil across towns. The objective is to equalize the fiscal capacity across towns; but, aside for some windfall gains and losses, the major effect is to lower the price of education in the property-poor towns, and depending on the finance scheme used, raise the price of education in the property-rich towns. There may be some modest income effects as a result of windfall gains and losses to property owners at the time of the reform, but subsequent property owners will not be affected at all by reform since any advantage or disadvantage will be reflected in a higher or lower price for property.

After windfall gains and losses wash out, all that remains is the price change. The impact of this price change on changes in school spending will turn on the price elasticity of demand. The analysis indicates that the greater the elasticity of demand, the greater the resulting change in spending for a given change in price. The price elasticity of demand also appears to have an important bearing on the capitalization effects of finance reform when comparing homes within a town. Simply put, the greater the price elasticity of demand, the greater will be the proportional change in the value of lower valued homes within a town. The smaller the price elasticity of demand, the more proportional capitalization effects will be across homes of varying values.

The analysis also demonstrates that the source of the fiscal residual (resulting in the lower price for education) may have an impact on the outcome of the currently-popular approach of equalizing effective school tax yields across towns. When the increase in property base per pupil results

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[35]Once other local expenditures are introduced, this model becomes more complicated. If the towns have different expenditure requirements from a given tax base, then equalizing the base per pupil for school spending will not result in equal market values or tax-price for otherwise identical properties.

because of the development of higher quality homes in the town, the equalization of revenue yield across towns also equalizes the value of identical homes and the price of education. When differences in the property base stem from differences in the industrial content of the base, then school tax equalization programs may actually make the value of the home in the property-poor town exceed the value of an identical home in the property-rich town.

The ultimate usefulness of the model rests on the actual extent of public expenditure and tax capitalization prevailing in the real world. In particular what values do α and β take on? If public expenditure and tax differences exist in the real world, but are largely ignored in the housing market, then fiscal residuals will not affect home values, and an equalization subsidy may be more warranted (although, because home values in the richer towns do not rise, the subsidy will appear less necessary). There is a rich and growing literature examining the extent of expenditure and tax capitalization within and across towns in the United States. In the next chapter a review of that literature will be presented. The following two chapters will specify and test a model of fiscal capitalization for a sample of Connecticut towns. Also of empirical significance for policy purposes are the price and income elasticity of demand. These will be derived later and the policy implications will be drawn.

CHAPTER 3

EMPIRICAL EVIDENCE ON CAPITALIZATION

In the last decade there have been more than a dozen studies attempting to determine whether, ceteris paribus, differences in taxes and public expenditures become capitalized into the value of property. The usual approach involves the multiple regression format including a number of additional explanatory variables that are used in an attempt to isolate the marginal contribution of taxes and public expenditures to the value of housing. Most researchers use a simultaneous equation system to eliminate the bias resulting from the joint causality of property values and fiscal variables. Although this research is not aimed at the school financing reform issue, it should shed some light on the empirical content of fiscal capitalization effects.

A. Cross-Section Studies

Oates attempted to explain the median value of single-family homes across towns within commuting distance of New York City.[36] He employed a number of variables to account for the physical and locational characteristics of the property and included the property tax rate and per pupil spending as measures of fiscal variables. Both the tax rate and school expenditure coefficients had the expected signs and were significant. Oates concluded that about 65 percent of property tax differences and a larger percentage of school spending are capitalized into the value of property.

After questioning the specification of the Oates model, Pollakowski fitted a modified version to a sample drawn from the San Francisco metropolitan area.[37] His findings confirmed the results of Oates, but the sensitivity of his results to the specification of the model indicate that these results should be interpreted with caution. More recently Edel and Sclar examined capitalization effects within the Boston area using census years 1930 through 1970.[38] They found a decreasing amount of capitalization over the period and viewed this as evidence that during the period the public goods market was approaching equilibrium.

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[36]Wallace E. Oates, Fiscal Federalism (New York: Harcourt Brace Javonavich, 1972).

[37]Henry O. Pollakowski, "The Effects of Property Taxes and Local Public Spending on Property Values: Comment." Journal of Political Economy, 81 (July/August 1973), pp. 994-1003.

[38]Matthew Edel and Elliot Sclar, "Taxes, Spending, and Property Values: Supply Adjustment in a Tiebout-Oates Model." Journal of Political Economy, 82 (September/October 1974), pp. 941-954.

Meadows has tested a more sophisticated version of the Edel and Sclar model, using additional explanatory variables in a simultaneous equation system.[39] His results are consistent with those of Edel and Sclar: the effects of capitalization appear to diminish over time as communities grope toward a Tiebout-like equilibrium.

B. Natural Experiments

Sometimes events permit a natural experiment. Several natural experiments have been conducted which examined property tax capitalization in situations where it was possible to hold other factors constant and isolate the effects of some change in the system. Wicks, Little, and Beck examined the effects of a general reassessment in Montana that altered the relative tax burdens in subsequent periods.[40] They focused on the tax capitalization effects resulting from the increased tax burden by comparing the estimated sale price of homes in the absence of reassessment with the actual sale price. They found nearly complete capitalization.[41]

A more comprehensive study adopting a similar natural experiment approach was undertaken by Smith who considered the effects of a dramatic reassessment in the city of San Francisco.[42] Prior to 1967, various types of property in that city were assessed at different ratios, but a court ruling required uniform assessment ratios across classes of property. The resulting reassessment changed relative tax shares so as to increase the taxes paid by homeowners. However, public outlays remained relatively constant. As in the Wicks study, Smith compared predicted sale prices, in the absence of reassessment, with actual sales prices and found consistent and sizeable capitalization effects because of the reassessment.

One of the most natural of experiments occurred in San Francisco when a transit system was installed on the border between two towns. There had been a tentative agreement that each town would support the project's construction and operation; after it was approved, one town withdrew its support. The other town decided to go ahead with the project anyway. Consequently, one town financed the operation through higher property taxes, while the otner paid nothing. Residents of both towns had equal access to the facility. Moody examined the sales records of 1300 nearly identical homes on both sides of the border and found that property values in the taxed town were

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[39]George R. Meadows, "Taxes, Spending, and Property Values: A Comment and Further Results." Journal of Political Economy, 84 (August 1976), pp. 869-880.

[40]John H. Wicks, Robert A. Little and Ralph A. Beck, "A Note on Capitalization of Property Tax Changes." National Tax Journal, 21 (September 1968), pp. 263-265.

[41]Ibid, p. 265.

[42]R. Stafford Smith, "Property Tax Capitalization in San Francisco." National Tax Journal, 23 (June 1970), pp. 177-193.

significantly lower than those in the "free-rider" town. In fact, the tax appeared to be more than fully capitalized.[43]

C. Individual Homes

Two studies have attempted to examine capitalization through cross-section micro data on individual homes. King reviewed the sales records of 2000 single-family homes in the New Haven area; making use of information concerning the residents' perceptions of neighborhood services and amenities, he found evidence of property tax capitalization at a rate of up to 50 percent.[44] One problem King confronted in examining individual homes was that assessment errors tended to cloud the tax picture, creating uncertainty in the taxpayer's mind concerning future taxes. Church also viewed a cross-section of homes in an attempt to uncover capitalization effects.[45] His sample consisted of 957 single-family homes in Martinez, California, and included 90 description characteristics for each property. After adjusting for the possibility of assessment error, Church found that the property tax appeared to be more than fully capitalized in each of the five neighborhoods that he examined.[46]

Recently Gustely has argued that, because previous empirical work viewed the total tax rate and total expenditures (including state aid), this aggregation may have led to a bias in those results.[47] In a sample of communities in the Syracuse area, he found a significant amount of property tax capitalization, but these results were obtained only for school property taxes, not for non-school property taxes. Moreover public expenditure capitalization was positive and significant only after the extent of intergovernmental aid was netted out. Gustely also divided his sample into urban and rural communities and showed that capitalization effects appeared to differ between the two samples.

Only one study in recent years has failed to yield evidence supporting property tax capitalization. Hyman and Pasour argued that the supply of housing is likely to be more elastic in the less populated areas than in

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[43]James P. Moody, "Measuring Tax and Benefit Capitalization From a Local Rapid Transit Investment in the San Francisco Bay Area." (Unpublished Ph.D. dissertation, University of California, Berkeley, 1973).

[44]A. Thomas King, Property Taxes, Amenities, and Residential Land Values. (Cambridge, Massachusetts: Ballinger Publishing Company, 1973).

[45]Albert M. Church, "Capitalization of the Effective Property Tax Rate on Single Family Residences." National Tax Journal, 27 (March 1974), pp. 113-122.

[46]Ibid., p. 116.

[47]Richard D. Gustely, "Local Taxes, Expenditures and Urban Housing: A Reassessment of the Evidence." Southern Economic Journal, 42 (April 1976), pp. 659-665.

metropolitan areas of the northeast.[48] They examined a sample of North Carolina towns, excluding major cities, and found the property tax rate had an insignificant effect on property values. However, there was a small positive effect accorded local public services.

D. Capitalization and Rents

Capitalization effects have been examined less directly in studies that consider the impact of tax and public expenditure differentials on differences in rents across communities. The argument goes that if, ceteris paribus, higher taxes cannot be passed on as higher rents, then these taxes will more likely be capitalized into the value of property. If these higher taxes can be passed along to renters, then that portion of the tax that can be passed along should not reduce the value of property. The argument concerning public expenditures runs the other way, since higher public expenditures, ceteris paribus, are viewed as an attractive feature of the community. If higher public expenditures, ceteris paribus, can be passed along to renters as higher rents, then these higher public outlays will more likely become capitalized into the value of property leading to higher property values.

Gustely found no evidence that the property tax was passed along to renters in either his urban or rural sample.[49] Orr examined a sample of towns in the Boston area and found some evidence that up to 50 percent of the tax is passed on to renters.[50] Finally, Hyman and Pasour found evidence that about half the tax was shifted to renters for their sample of North Carolina towns.[51] Few researchers examined the impact of public expenditure differences, ceteris paribus, on rental values. Hyman and Pasour found no evidence that

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[48]David N. Hyman and E. C. Pasour, Jr., "Property Tax Differentials and Residential Rents in North Carolina." National Tax Journal, 26 (June 1973), pp. 303-307.

[49]Gustely, "Local Taxes," pp. 659-665.

[50]See Larry L. Orr, "The Incidence of Differential Property Taxes on Urban Housing." National Tax Journal, 21 (September 1968), pp. 253-262; and Larry L. Orr, "The Incidence of Differential Taxes: A Response." National Tax Journal, 23 (March 1970), pp. 99-101 for further information on this research. As demonstrated later, a fuller specification of Orr's model may not yield such results.

[51]Hyman and Pasour, "Property Tax Differentials," pp. 303-307.

higher public expenditures resulted in higher rents.[52] Gustely found that higher per pupil spending resulted in higher rents in rural areas, but not in urban areas.[53]

E. Summary

Thus, the evidence concerning capitalization of fiscal variables generally supports the view that public spending differences, and particularly tax rate differences across towns, become capitalized into the value of property. The extent of this capitalization appears to vary from region to region, with more extensive capitalization occurring in metropolitan areas. The empirical work was not aimed at the school finance reform issue. The only way to examine the effects of fiscal capitalization on school finance reform in Connecticut is to consider a sample of Connecticut towns. That empirical investigation appears in Chapter 4.

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[52]Ibid., p. 603.

[53]Gustely, "Local Taxes," pp. 659-665.

CHAPTER 4

SPECIFICATION OF THE MODEL

In some respects Connecticut towns represent a particularly attractive sample for examining tax and public expenditure capitalization. The property tax represents such an overwhelming source of local tax revenues, 99 percent,[54] that other taxes can safely be ignored. In addition, user charges make up a much smaller fraction of local revenue in Connecticut than in nearly all other states.[55] On the expenditure side, there is little variability across Connecticut towns in the amount of per pupil aid provided by the State. This relative uniformity in State aid creates less "noise" in the system so that differences in fiscal variables across towns are not clouded by intergovernmental grants. Each town has its own assessing and tax collecting procedures so that fiscal decisions are local decisions.

The same forces that enhance the appeal of the State as a test bed for the capitalization thesis, also create data problems. Since each town is largely autonomous, reassessment of property is often infrequent and sporadic. Some of the larger cities have not had a general reassessment in 20 years.[56] Whereas other states, particularly those with state aid formulas geared to the local tax base, maintain updated information concerning property tax values across towns, Connecticut has no such central information-gathering authority. Consequently, before fiscal variables such as the effective property tax rate can be determined, the actual value of the tax base must be calculated somehow. This infrequency of reassessment also creates some uncertainty in the taxpayer's mind concerning the future tax liability of a particular piece of property; for during periods of rapidly changing property values, assessed values become quickly dated. A general reassessment, bringing all properties into line, often results in a relative gain or loss for any given homeowner.

A. The Sample

The selection procedure adopted in this study provides reliable, updated information on the property tax base in each town and also ensures that existing and potential homeowners have reliable information about the tax liability associated with each piece of property. The sample consisted of those towns with populations larger than 2500 that had revalued property in the years 1968, 1969, or 1970.

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[54]William A. McEachern and Gerald Sazama, Fiscal Crisis in Connecticut: State-Local Interdependence (New Haven: Connecticut Conference of Municipalities, 1975), p. 48.

[55]Ibid., McEachern and Sazama have found that another advantage of Connecticut is that school districts and towns are one and the same.

[56]Ibid., p. 51.

A total of 75 towns had revalued during this three-year period. Of this group, 16 towns with populations below 2500 had to be eliminated because of the absence of the necessary census data. Five other towns had to be dropped because median housing values were not reported for towns with median housing values exceeding $50,000. As it turned out, the towns under 2500 tended to be the poorest of towns with respect to property values (e.g., Chaplin, Hampton, Scotland, Sprague, and Voluntown), while the towns omitted because of the $50,000 ceiling on reported figures obviously tended to be the richest (e.g., Greenwich, New Canaan, Weston, Westport, and Wilton). Therefore, the sampling procedure had the overall effect of dropping both the high and low extreme values from the sample. Moreover, the wealthy towns omitted were all located near New York City; no doubt part of the value of property in that area results from its proximity to a unique labor market. In short, the overall impact of this process of elimination was to make the sample more homogeneous.

The grand lists were then adjusted for differing assessment ratios across towns. Taking into account recent assessment, previous assessment, and additions to the grand list in the interim, estimates of the property base in each of these towns could be derived for the years 1967 through 1970. The sample was drawn from a study by Edward Johnston in which he attempted to develop a reliable set of tax and school expenditure figures.[57] As a check on the accuracy of these estimates, effective tax rates for five towns in this sample were compared with those of a sample developed by King in his study of the New Haven area.[58] King derived effective tax rates for the towns starting from the value of individual homes. Tax rates for the two samples were nearly identical, suggesting that Johnston's estimation procedure was reliable. It appeared more reliable than procedures adopted by the State-sponsored study which began with the grand list for each town as of the last evaluation and applied a county-wide compound annual growth rate in the market value.[59] The procedure used in the present study yields a comparable set of data from which estimates of effective tax rates in each town can be derived.

Because the sample was confined to towns that had revalued property during the three-year period, it is biased against the largest towns since these towns are most lax in the frequency of reassessment. The omission of the largest towns does make the sample more homogeneous and a more proper test of the Tiebout hypothesis. All but two of the towns are below 50,000 in population with the largest at 68,000. There is some question as to what is a

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[57]Edward J. Johnston, Jr., "Evaluation of Alternative Property Tax Systems to Reduce Disparity in Education Expenditures and Property Tax Rates Among Connecticut Towns." (Ph.D. dissertation, University of Connecticut, May 1975), Chapter 2.

[58]King, "Property Taxes."

[59]Financing Connecticut's Schools.

proper sample for examining the capitalization hypothesis.[60] Many samples have been confined to towns around a single metropolitan area; others have focused on several major urban areas or an entire state. Connecticut is such a small state that it appears legitimate to span the State in one sample, particularly in view of the fact that the sample can be broken down into urban and rural subsamples.

B. The Model

Differences in housing values across towns obviously are the result of a number of market forces. The size, quality, and age of homes in the town should be considered. The quality of the neighborhood and its nearness to labor and commercial market centers will also play an important role. Of course, there are the fiscal variables: the taxes and public expenditures associated with the average home in the town. Previous studies have attempted to determine the extent of fiscal capitalization by estimating what amounts to a reduced form equation.[61] Property values are "explained" through the use of relevant variables that are included to capture the forces of supply and demand in the housing market. The approach in this study will be similar.

In the absence of any theoretical justification for specifying the model otherwise, a linear model was employed[62] as follows:

$$V_i = \alpha_o + \alpha_1 P_i + \alpha_2 S_i + \alpha_3 Y_i + \alpha_4 R_i + \alpha_5 D_i + \alpha_6 B_i + \mu_i$$

where V_i is the median value of owner-occupied housing in 1970 for town i; P_i is the average effective property tax (in mills) during the period 1967-1970; S_i is the average per pupil expenditure over the period 1967-1970; Y_i is median family income in 1970; R_i is the median number of rooms per home in 1970; D_i is the linear distance in miles from the center of town i to the nearest central city; B_i is percentage of housing built since 1960, as of 1970; and μ_i is the random disturbance term with mean zero and variance σ^2_μ. The value of housing, income, rooms, and construction data were drawn from

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[60]Thomas G. Cowing, "Real Property Taxes, Local Public Services, and Residential Property Values: Comment." Southern Economic Journal, 41 (October 1974), pp. 325-329; and David N. Hyman and E. C. Pasour, Jr., "Real Property Taxes, Local Public Sector Services, and Residential Property Values." Southern Economic Journal, 41 (October 1974), pp. 329-331.

[61]See Bibliographic Reference Nos. 12, 20, 28, 32, 36, 37, 41, 52, 56, 67, and 73.

[62]However, it should be noted that the log-linear form was also employed, but the overall explanatory power of that specification was below that of the linear model. Population density was also employed as an independent variable, but it did not add significantly to the explanatory power of the model.

1970 Bureau of the Census figures.[63] There will also be an equation to examine the relationships between fiscal variables and rent. The dependent variable will be the median contract rent in the town. The explanatory variables will be the same as with the value of housing except median rooms for rental units will be used plus one other variable to be described below.

C. Hypotheses

Hypotheses concerning the quality and environmental factors are fairly straightforward. Although it is important that these factors be accounted for, they are not the focus of this study. Median family income is included both as one measure of the town's ability to pay and as some index of neighborhood quality. Also, as has been suggested in an earlier study,[64] median-income--to the extent that it is correlated with the wage rate in an area--may serve as a proxy for construction costs (though this effect will likely be less obvious in a State as small as Connecticut). It is also expected that larger and newer homes will be more expensive, as will homes that are nearer centers of labor and commercial activity.

The fiscal variables deserve more attention. The effective property tax rate is used here as the relative measure of tax burden in the town. This rate, like per pupil expenditures, is averaged over four years to even out aberrations in the year-to-year tax and expenditure rate and to provide ample time for capitalization of differences across towns. The hypothesis is that the higher the tax rate, ceteris paribus, the lower the value of property (i.e., $\alpha_1 < 0$). Although the property tax rate will be used here for the initial estimates, there are grounds for questioning the use of this aggregate tax figure. Edel and Sclar[65] have shown conceptually, and Gustely[66] has demonstrated empirically that viewing the tax rate as a single variable may mask underlying capitalization effects which can be observed only after the tax rate is broken down into its components. Therefore, an equation will be estimated in which the tax rate is divided into that portion applied to school finances and taxes utilized for other purposes. Such a breakdown becomes particularly useful in the context of school finance reform since the legislative and judicial discussion has focused on the school tax rate, not the property tax rate.

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[63]Department of Commerce, Bureau of the Census, 1970 Census of Housing (Washington, D.C.: U.S. Government Printing Office, 1972). Census data on housing values are drawn from the owner's appraisal of the house value. See also Wallace C. Oates, Fiscal Federalism (New York: Harcourt Brace Javonavich, 1972).

[64]David N. Hyman and E. C. Pasour, Jr., "Real Property Taxes, Local Public Sector Services, and Residential Property Values." Southern Economic Journal, 39 (April 1973), pp. 601-611.

[65]Edel and Sclar, "Taxes, Spending, and Property Values," pp. 941-954.

[66]Gustely, "Local Taxes," pp. 659-665.

The impact of tax differences on rental values will also be examined. If some or all of tax differences across towns, ceteris paribus, can be passed along to renters, then the coefficient of the tax variable will be positive (i.e., $\alpha_1>0$). If the rental market across towns is somewhat competitive (and there is some empirical support for this in Ellickson[67]), it is not clear why a renter would be willing to pay higher rents than he would have to in another town for identical services (note the ceteris paribus assumption). There is a symmetry between rent capitalization and housing capitalization. If higher taxes can be passed along to renters, then less of the tax increase will become capitalized into the value of property; but if ceteris paribus increases and the tax rate cannot be passed off to renters, then these increases will more likely become capitalized into the value of property.

Selecting some measure for the quality of local public service is always a problem for there are no unambiguous measures of output. Most work of this nature relies simply on the cost of inputs. This study will follow past convention and employ school expenditures per pupil as a proxy measure of output in the public sector. Expenditures per pupil is a measure that captures both the quality of faculty and average class size. It is, therefore, more attractive than some other measures of educational services. This exclusive reliance on per pupil expenditures is dictated largely by the lack of reliable data in Connecticut concerning other measures of public services for each town.[68] Of course, there is no conclusive evidence that greater school spending results in higher quality education, particularly when comparing expenditure levels across towns, since environmental factors are likely to affect the productivity and the value of school expenditures. There will likely be more measurement error in the expenditure variable than in the tax variable. If school spending serves as an index of the overall quantity and quality of public services in the town, higher school spending should, ceteris paribus, result in higher property values (i.e., $\alpha_2>0$). When considering rents, if the landlord can capture the benefits of ceteris paribus increases in public services, then higher school spending will result in higher rents.

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[67]Robert C. Ellickson, "Suburban Growth Controls: An Economic and Legal Analysis." Yale Law Journal, 86 (January 1977), p. 394.

[68]The omission of information concerning other types of local expenditures can be justified in part because school spending makes up such a large fraction of local spending, representing well over half of local spending in most towns (an average of 65 percent for this sample). Moreover, past empirical work has found that expenditures on other services have contributed little to the explanatory power of the model (See Bibliographic Reference Nos. 28, 37, and 55). Also see Gerald S. McDougall, "Local Public Goods and Residential Property Values: Some Insights and Extensions." National Tax Journal, 29 (December 1976), pp. 436-447. McDougall has had some success by using more direct measures of quality.

Per pupil spending consists of both locally raised funds as well as State and Federal aid. Gustely[69] has argued that previous research, in combining these sources of expenditures, may have resulted in an aggregation bias. In his research, expenditure capitalization was found only after State and Federal aid has been netted out. This study will also net out State and Federal per pupil aid; but unlike Gustely, the model will include this aid as an additional explanatory variable. In this model, higher State and Federal aid, ceteris paribus, should be associated with higher property values. If renters are charged for the benefits of this aid, higher aid will result in higher rents. However, to the extent that State and Federal aid is designed to offset the lack of a local fiscal base, then the relationship between school aid and property values may be difficult to sort out. That is, greater aid is often provided the poorer towns and this policy is likely to confuse an examination of capitalization effects.

Because Connecticut has a mix of urban and rural towns and because past empirical work suggests that capitalization effects may differ between two such samples, the equation to be estimated will first be calculated using all 54 towns. It will then be estimated employing the urban sample and the rural sample. The definitions of urban and rural are those drawn from the Census Bureau. Essentially urban areas are defined as central cities, or twin cities with populations exceeding 50,000 inhabitants. In addition "surrounding closely settled" towns are also defined as urban areas.[70] Other towns are defined as rural.

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[69]Gustely, "Local Taxes," pp. 659-665.

[70]Department of Commerce, 1970 Census of Housing, Appendix A, p. 5.

CHAPTER 5

EMPIRICAL RESULTS

Least-square estimates were calculated for the entire sample of 54 towns and for each subsample of urban and rural towns. The model was run with both the median value of housing and median monthly rent as dependent variables. The results utilizing the total tax rate and total per pupil expenditures are presented in Table 5.1. The coefficients for the property tax rate variable in the combined sample column indicate that higher taxes do not appear to be passed along to renters, but do become capitalized into the value of the property. Total school spending per pupil is passed along to the renter in the form of significantly higher rents; as indicated in the owner equation, higher school spending appears to make the property more valuable, but this coefficient is not significant. Nearly all of the remaining explanatory variables have the expected sign and are significant at the .05 level or better (one-tailed test).[71] In the rental equation there is an additional explanatory variable for quality--the percentage of rental units without plumbing; this has the expected sign and is significant in all but the urban sample.

When the sample is divided into the urban and rural components, the results for the tax variable remain essentially as before, though now the tax coefficient for the urban sample is not significant. However, the results for total school spending suggest that, although school spending appears to be passed on as higher rents in the urban sample, the property owners are not able to capitalize on this spending. The results for the rural sample are more consistent, indicating that higher school spending can be passed along as higher rents, and this spending does become capitalized into the value of property. The overall explanatory power of the model is high, particularly for a cross-section study.

A. Simultaneous Equations

Since there remains the possibility of simultaneous-equation bias and since the tax rate and school expenditure variables in turn depend on property values, each set of equations was reestimated using

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[71]A notable exception is the significant but negative sign associated with the median number of rooms of rental properties. This is the same sign found by earlier rent studies (see Bibliographic Reference Nos. 21, p. 662; 36, p. 305; and 58, p. 100) and suggests that the median room size is a poor proxy for the quality of rental units. One possible explanation for such a perverse result is that apartments with larger numbers of rooms tend to be more tenement-type units, while the more attractive apartment complexes are often limited to one- or two-bedroom apartments.

TABLE 5.1

DETERMINANTS OF HOUSING AND RENTAL VALUES: AGGREGATE MODEL

	Combined		Urban		Rural	
	Owner	Renter	Owner	Renter	Owner	Renter
PTAX	-173.41**	-0.06	-182.02	0.20	-163.16*	-0.27
	(-2.84)	(-0.12)	(-1.73)	(0.17)	(-1.97)	(-0.55)
TPPE	3.29	0.10**	-6.51	0.11*	8.91*	0.07**
	(0.97)	(4.18)	(-1.29)	(1.86)	(1.81)	(2.71)
MFI	1.84**	0.004	1.51**	0.006	1.70**	0.005
	(5.23)	(1.56)	(2.78)	(0.99)	(2.99)	(1.63)
RMS	5,906**	-18.53**	8,307**	-28.96*	5,716**	-18.24*
	(5.70)	(-3.01)	(3.97)	(-1.92)	(4.25)	(-2.35)
DIST	-37.75	-0.71*	-17.80	-1.31	-12.14	-0.74*
	(-0.71)	(-1.94)	(-0.21)	(-1.41)	(-0.15)	(-1.85)
BS60	71.07*	0.66**	83.90*	0.72	80.26	0.50*
	(2.31)	(3.12)	(1.90)	(1.53)	(1.70)	(2.06)
CONST	-32,883**	72.56	-35,217**	70.18	-35,708**	94.72*
	(-6.88)	(1.96)	(-4.60)	(1.08)	(-5.40)	(1.86)
W/O PLMB		-2.15**		-1.16		-3.07**
		(-2.52)		(-0.72)		(-2.83)
R^2 =	0.875	0.764	0.911	0.683	0.885	0.85
F =	54.86**	21.32**	29.05*	4.929**	29.36**	18.13**

*Significant at 0.05 level.
**Significant at 0.01 level.
(The numbers in parentheses are the t-statistics.)

PTAX = Property Tax Rate
TPPE = Total Per Pupil Expenditures
MFI = Median Family Income
RMS = Median Number of Rooms
DIST = Distance in Miles to Nearest Central City
BS60 = Percentage of Housing Built Since 1960
CONST = Constant Term
W/O PLMB = Percentage of Residential Units without Plumbing

instrumental variables in a two-stage least squares procedure.[72] The results, listed in Table 5.2, with a few notable exceptions, generally confirm the single equation results. In particular, the effects of tax capitalization on the value of property appear stronger and more significant in each of the three samples. Higher tax rates, ceteris paribus, do not appear to be passed along to renters and do appear to result in lower market values. Moreover, tax differences seem more extensively capitalized in the urban sample than in the rural sample. This finding is consistent with the view that the supply of housing is less elastic in urban areas than in rural areas.

Per pupil expenditures are not significantly related to higher property values in any of the samples. Indeed, the sign for this coefficient is negative in the urban sample for both the market value and rental equations. For the combined sample and for the rural sample, higher rents are associated with higher per pupil outlays. Thus, it appears that in these instances the higher school spending can be passed along as higher rents.[73] Results for the remaining variables are similar to those for the single equation model. However, the perverse negative sign found earlier for the room coefficients in the rental equations is no longer significant and becomes positive in the rural sample.

B. Disaggregated Model

The property tax rate and per pupil spending were broken down into their components and the results of ordinary least squares are presented in Table 5.3. The coefficients of the fiscal variables underscore the usefulness of disaggregating the model in this way. It appears that it is primarily the school tax rate that becomes capitalized into the value of property. Indeed, in no instance does the tax rate for other local services even have the expected sign.[74] There is no evidence that either tax can be passed along to renters in any of the samples. Again as with the total tax model, the extent of school tax capitalization appears greater among the urban towns.

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[72]Instrumental variables used to explain the fiscal variables were the percentage of the town's population of school age, the median years of education for males 25 years or older, the average property base per pupil, and the percentage of residents residing in owner-occupied housing.

[73]It is possible that the school spending variable in these rental equations may be serving as a proxy for other environmental characteristics of the town since more attractive towns are more likely to have higher educational outlays. Note how poorly the income variable performs in the equations where school spending is significant.

[74]This finding is consistent with the research of Gustely, "Local Taxes," pp. 659-665. He is the only other researcher to consider a disaggregated tax model.

TABLE 5.2

DETERMINANTS OF HOUSING AND RENTAL VALUES: INSTRUMENTAL VARIABLES

	Combined		Urban		Rural	
	Owner	Renter	Owner	Renter	Owner	Renter
PTAX	-237.94**	0.78	-388.59**	-1.51	-219.32**	1.47
	(-2.87)	(0.77)	(-3.55)	(-0.69)	(-2.14)	(1.30)
TPPE	3.96	0.14*	-7.11	-0.01	6.25	0.18**
	(0.71)	(2.37)	(-0.95)	(-0.10)	(0.87)	(2.52)
MFI	1.83**	0.001	1.28*	0.015	1.94*	-0.005
	(4.26)	(0.01)	(2.05)	(1.50)	(2.73)	(-0.72)
RMS	5,749**	-10.73	9,050**	-53.52	5,646	1.92
	(5.34)	(-1.01)	(3.50)	(-2.02)	(4.13)	(0.12)
DIST	-49.44	-0.97*	7.23	-0.93	-3.73	-1.11*
	(-0.88)	(-1.89)	(0.07)	(-0.76)	(-0.04)	(-1.80)
BS60	71.03*	0.84**	95.86*	0.67	65.41	1.15*
	(2.13)	(2.73)	(1.90)	(1.09)	(1.22)	(2.32)
CONST	-30,739**	23.24	-31,650**	192.33	-34,428**	-20.95
	(-6.20)	(0.35)	(-3.56)	(1.54)	(-5.06)	(-0.22)
W/O PLMB		-2.04*		-2.24		-3.81*
		(-2.19)		(-0.99)		(-2.37)
R^2 =	0.872	0.729	0.886	0.477	0.881	0.694
F =	53.39**	15.03**	22.05**	2.08	28.39**	16.02**

*Significant at 0.05 level.
**Significant at 0.01 level.
(The numbers in parentheses are the t-statistics.)

PTAX = Property Tax Rate
TPPE = Total Per Pupil Expenditures
MFI = Median Family Income
RMS = Median Number of Rooms
DIST = Distance in Miles to Nearest Central City
BS60 = Percentage of Housing Built Since 1960
CONST = Constant Term
W/O PLMB = Percentage of Residential Units without Plumbing

TABLE 5.3

DETERMINANTS OF HOUSING AND RENTAL VALUES: DISAGGREGATE MODEL

	Combined		Urban		Rural	
	Owner	Renter	Owner	Renter	Owner	Renter
SCHTX	-305.25**	0.13	-359.42**	0.82	-295.31**	-0.23
	(-4.17)	(0.23)	(-2.87)	(0.51)	(-2.81)	(-0.38)
OTHER TX	133.67	-0.59	108.48	0.64	222.19	-0.10
	(1.04)	(-0.54)	(0.53)	(0.26)	(1.06)	(-0.09)
LPPE	3.56	0.10**	-6.22	0.06	7.73	0.08**
	(1.10)	(4.11)	(-1.01)	(0.86)	(1.65)	(2.83)
AID	-38.94*	0.08	-33.59	0.49	-36.69	-0.10
	(-2.52)	(0.65)	(-1.15)	(1.46	(-1.63)	(-0.88)
MFI	1.95**	0.003	1.60**	0.01	1.99**	0.004
	(6.02)	(1.35)	(2.76)	(1.27)	(3.64)	(1.38)
RMS	5,441**	-19.15**	8,218**	-28.29	4,751**	-18.09*
	(5.75)	(-3.00)	(4.21)	(-1.80)	(3.63)	(-2.34)
DIST	20.93	-0.84*	78.92	-1.22	12.50	-0.90
	(0.36)	(-1.94)	(0.81)	(-1.07)	(0.15)	(-2.13)
BS60	91.94**	0.64**	112.83**	0.63	83.03*	0.54*
	(3.23)	(2.80)	(2.65)	(1.20)	(1.91)	(2.21)
CONST	-24,931**	87.46	-32,477**	-27.35	-24,583**	137.26*
	(-4.31)	(1.78)	(-3.31)	(-0.23)	(-2.39)	(2.39)
W/O PLMB		-2.29**		-1.13		-3.29**
		(-2.54)		(-0.63)		(-3.05)
R^2 =	0.875	0.766	0.934	0.712	0.910	0.869
F =	54.86**	16.03**	26.38**	3.83**	26.42**	14.74**

*Significant at 0.05 level.
**Significant at 0.01 level.
(The numbers in parentheses are the t-statistics.)

SCHTX = School Tax Rate
OTHER TX = Property Tax Rate for Other Services
LPPE = Per Pupil Expenditures from Local Sources
AID = Per Pupil State and Federal Aid
MFI = Median Family Income
RMS = Median Number of Rooms
DIST = Distance in Miles to Nearest Central City
BS60 = Percentage of Housing Built Since 1960
CONST = Constant Term
W/O PLMB = Percentage of Residential Units without Plumbing

On the expenditure side, local school spending is positively related to property values in the combined sample and the rural sample, but in neither case is this significant. Indeed, the urban and rural towns appear the mirror image of one another. In urban towns, where increases in local school spending do not result in significantly higher rents, the relationship between housing values and school spending has the "wrong" sign. Whereas in the rural towns, where higher local school spending does translate into higher rents, the relationship between housing values and school spending has the expected sign, but would be significant at only the 0.10 level.[75] Hence, these results are at least internally consistent.

The expected sign for the outside aid coefficient is positive (if the ceteris paribus assumptions hold). The negative sign in all the owner equations suggests simply that more aid is going to the property poor areas. But the positive relationship between per pupil school aid and median rents in the urban sample raises the possibility that urban landlords may be able to capture part of the benefits of outside aid through higher rents. Such a finding, though clearly tentative, suggests that aid to towns may not be the best way of providing relief to the poor.

Again, because of the possibility of simultaneous-equation bias, the equations in Table 5.3 were reestimated using instrumental variables in a two-stage least squares procedure. However, the lack of variability in the "predicted" aid variable resulted in a near singular matrix and undermined the estimation procedure. The possibility of simultaneous-equation bias in the disaggregated model cannot be ruled out.

C. Capitalization Rates

A look at the impact of capitalization on some average values of the figures involved will convey some magnitude to the capitalization phenomena. The average price of the homes in the sample is about $25,000, and the average mill rate is 23.0. If the tax rate in the average town were raised by one mill, ceteris paribus, and if this tax increase became fully capitalized, a fall in housing values of about $300 would result (assuming a 40-year housing life and a five percent discount rate).[76] The simultaneous-equation results presented in Table 5.2 yield the most reliable estimates of tax capitalization. The coefficient in Table 5.2 for the tax rate variable using the entire sample is a negative 238, implying that an increase of one mill, ceteris paribus, will result in a depreciation in housing value

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[75]One possible explanation for the differences in local school spending effects between the two samples is that in urban towns higher school spending may not result in a higher quality of education; hence, higher spending does not translate into higher housing values. Urban schools are often burdened with higher security costs, vandalism costs, and usually have greater need for special or remedial programs.

[76]See Oates, Fiscal Federalism, p. 173 for a description of the calculations involved.

of $238. Comparing this figure to the $300 associated with full capitalization, a capitalization rate of about 80 percent is implied. Of course, different discount rates will yield different rates of capitalization. A three percent discount rate leads to only a 65 percent rate of capitalization, while an eight percent rate yields 100 percent capitalization. The choice of a three percent rate appears too low and eight percent appears too high under the circumstances. The five percent rate is most often employed in these studies.[77]

With the five percent discount rate, the 80 percent rate of tax capitalization is consistent with the results found in several earlier studies of other regions.[78] King examined tax capitalization in the New Haven area and found a capitalization rate of up to 50 percent.[79] The urban-rural split indicates that property taxes are more extensively capitalized in the urban sample (130 percent with a five percent discount rate) than in the rural sample (75 percent with a five percent discount rate). Although the urban estimate is higher than would be expected on theoretical grounds, several studies actually found capitalization rates of 100 percent or more.[80]

The effects of school spending are less consistent and less significant, so interpretations here are less meaningful. In Table 5.2 only the school spending coefficient in the rental equation is significant and only for the combined and rural samples. The coefficient for the combined sample suggests that a $1.00 increase in per pupil spending is associated with a $.14 increase in monthly rent, or a $1.68 increase in yearly rent. This figure seems unusually high, particularly when contrasted with the poor performance of the school spending variable in the owner equation.

D. Concluding Remarks

The evidence suggests that school tax differences across Connecticut towns, ceteris paribus, are not passed along to renters, but become capitalized into the value of property. Differences in local school spending do appear to be passed along to renters in all but the urban sample. These differences do not become capitalized into the value of property in any sample. Hence, tax differences, but not expenditure differences across towns, are reflected in the value of property. Of importance is the greater likelihood of measurement error with the output variable in contrast with the tax variable.

Little could be gleaned from the outside aid variable, in part no doubt, because there was little variability in this figure across towns. The only notable finding here was that additional school aid in urban areas, ceteris paribus, resulted in higher rents (though this was significant at only the 0.10 level). However, this finding should be viewed as quite tentative. Such a finding suggests that school aid to urban areas may not be the most effective way to deliver tax relief for the urban poor.

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[77]Ibid, p. 170.

[78]See Bibliographic Reference Nos. 28, 56, and 59.

[79]King, Property Taxes.

[80]See Bibliographic Reference Nos. 12, 52, 67, and 73.

For years the conventional wisdom has been that the property tax is a regressive tax.[81] More recently some economists have argued that the property tax, when viewed as a tax on capital in a general equilibrium context, acts more like a profit tax and should therefore be more properly viewed as progressive.[82] The evidence for Connecticut lends some support to the progressive thesis. Tax differences do not appear to be passed along to renters, but remain with the homeowner at the time of the tax change.

Any reform in the current system will create windfall gains and losses. The fact that there will be winners and losers does not necessarily mean that reform is not desirable, but it does suggest that policymakers should take care that the intended beneficiaries of reform are the ones who ultimately are benefitted. Who wins and who loses in the reallocation will depend on both the actual incidence of the property tax and the source of financing the reform. Perhaps of greater policy interest than short-term capital gains and losses is the ultimate impact of tax reform on the change in the price of education and the sensitivity of school spending to changes in that price. This issue is discussed in the next chapter.

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[81] Dick Netzer, The Economics of the Property Tax (Washington, D. C.: The Brookings Institution, 1969).

[82] Peter Mieskowski, "The Property Tax: An Excise or a Profits Tax?" Journal of Public Economics, 1 (April 1972), pp. 73-96.

CHAPTER 6

THE DEMAND FOR EDUCATION IN CONNECTICUT: EFFICIENCY CONSIDERATIONS

School finance reform has been predicated on the assumption that local school spending is sensitive to the local price of education and decreases in that price will result in substantially higher levels of spending. Power equalization programs represent attempts to alter the price of education so that property-poor towns will be able to finance education as cheaply as property-rich towns. A variable with important policy implications for school finance reform is the price elasticity of demand for education spending. How responsive is local school spending to changes in the price of education?[83] Moreover, what portion of inter-town differences in school spending is attributable to differences in the price of education and what portion is due to other factors such as differences in income or differences in tastes?

The courts have implicitly viewed differences in the price of education as the primary source of school spending differences across towns. Hence, in attempting to equalize the property base per pupil, the courts are groping for an equal price of education. There are two problems with this. The first is that, though the property base per pupil and the price of education are related, they are not identical. Secondly, it may be that price differences only account for a relatively small share of school spending differences.

This chapter will develop a demand function for local school spending. The model will then be tested using two samples of Connecticut towns: the first consisting of the 54-town sample employed in the previous chapter, and the second consisting of 133 of the State's 169 towns. After testing the model, the relative efficiency of price changes will be discussed. Equity considerations of both the current system and proposed reforms in this system will be treated in the next two chapters.

A. The Demand Function

A household's demand for education is obviously the result of a number of forces. The assumption set out in Chapter 2 that households attempt to maximize their utility subject to their budget constraints is continued in this chapter. Consistent with orthodox demand theory, the household's demand for education is assumed to be a function of the price of education, family income, tastes, and prices of related goods. As is often the custom it will be assumed that the prices of related goods are constant across households. Later, however, this assumption will be relaxed and an alternative will be discussed.

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[83]There have been a few attempts to estimate this elasticity for other states (See Bibliographic Reference Nos. 2, 4, and 26). Those results will be discussed later.

Within a town, though each family may desire different levels of education, only the outcome of the collective choice is actually observable. In view of the collective nature of the choice of school spending levels, this study will continue to employ the majority-rule, median-voter assumption, which holds that the community's effective demand for education is that quantity demanded by the voter desiring the median amount of education.[84] The median voter's demand function is assumed to take the following form:

$$E = kP^{\alpha}I^{\beta}Y^{\gamma} \qquad (6.1)$$

where E is the amount of education demanded, P is the price of education, I is income, and Y is the education level of the parents, employed here as one measure of tastes for education. The specification of each variable will be discussed in order.

Quantity of Education. In the absence of a more appropriate measure of quantity, local school spending per pupil represents the most straight-forward measure available. As noted earlier, this captures measures of both faculty quality and average class size. Since there is little variation in Connecticut in the outside aid component of school spending, only the local spending component is of concern in this discussion.

Price of Education. The price employed here is the measure of tax price derived earlier in Chapter 2; this is the price to the median household per dollar of per pupil spending. The price is derived in the following manner. The total market value of residential, industrial, and commercial property in the town is represented by $\Sigma V_i + M$. The median voter's share of the total tax load is $\frac{V_m}{\Sigma V_i + M}$ where V_m is the value of the home owned by the median voter. The total school tax bill in the town is nE, where n is the number of students and E is local per pupil spending (or, more specifically, the tax dollars raised per pupil). The median voter's total taxes are sV_m, where s is the effective school tax rate. The voter's taxes are also equal to his tax share of total spenidng or[85]

$$sV_m = \frac{V_m}{\Sigma V_i + M} \cdot nE \qquad (6.2)$$

To find the tax price, P (i.e., taxes per dollar of local school spending), simply move E to the left side yielding

$$P = \frac{sV_m}{E} = \frac{nV_m}{\Sigma V_i + M} \qquad (6.3)$$

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[84]Black, "On the Rationale," pp. 23-24.

[85]Note this formulation ignores local revenue sources other than property taxes. This seems safe since property taxes make up over 99 percent of local tax sources in Connecticut and user charges cannot easily be employed to finance education.

The middle expression is taxes per dollar of local school spending, or the tax price; the right hand expression is another way of expressing price, employed earlier in Chapter 2. This is an attractive measure of price because, unlike the school tax, the price does not depend on the actual level of spending chosen by the town (except for the minor feedback effects that fiscal decisions can have on the value of property). Moreover, unlike property wealth per pupil (the measure used by the courts as a proxy for price), the tax price varies for each resident of the town; it may vary even across towns with identical property bases, if the residential content of the tax base differs.[86]

In measuring the tax-price for empirical purposes it is assumed that the median value of owner-occupied housing in the town is a reasonably good approximation of the median voter's home value. Though this assumption under certain circumstances could create some small bias,[87] it has been employed in previous research, and is all that is available.

Income and Taste. Median family income for the town is the income measure employed. Again median family income is assumed to be a reasonable approximation of the household income of the median voter.[88] The measure of tastes to be employed is the median education level of adults over 25 in the town. This is considered a reasonable estimate of the median voter's education level. While education and income can be expected to register some of the same effects (since education and income are likely to be strongly related), it is also likely that levels of education achieved in the median household will have an independent effect on the demand for education.

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[86]In fact, Equation (6.3) explains how the tax-price is related to the property wealth per pupil. The property wealth per pupil is equal to the value of the home owned by the median voter times the reciprocal of the tax price.

$$V_m \cdot \frac{1}{P} = V_m \cdot \frac{\Sigma V_i + M}{nV_m} = \frac{\Sigma V_i + M}{n}$$

The final expression is, of course, the wealth per pupil. Relying strictly on property wealth per pupil as a proxy for price overstates the actual price in those towns in which the median home is below the state average and understates the actual price in those towns in which the median voter owns a home above the State average.

[87]This exclusive reliance on owner-occupied housing could create a bias to the extent that the rental content of housing varies across towns, if the rental units tend to be of lower value. If poorer towns tend to have more rental properties and if these properties are of below average value, then the voter in the median-valued home for owner-occupied units may live in a home of greater value than the mean for all residential units. Therefore, the estimate for price could be biased upward in these towns. See Bibliographic Reference No. 2 for further discussion.

[88]Some support for this assumption can be drawn from T. E. Borcherding and R. T. Deacon, "The Demand for the Services of Non-Federal Governments." American Economic Review, 62 (December 1972), pp. 391-401.

Prices of Related Goods. The assumption here is that the price of related goods across towns are equal or at least not introduced in a way that would systematically bias the results. While this is usually a reasonable assumption in most demand estimations of private goods, the relative price of other public goods may differ across communities and could affect the demand for education across communities.

If other public goods were treated in the same fashion as education (i.e., what would be the price to the median voter of raising per capita spending in non-school public services by $1.00), the tax price would look similar to that derived for education. It is simply the total cost of raising per capita spending by $1.00 (which is the population, P) times the median voter's share of that cost, or his property as a fraction of total property value $V_m/(\Sigma V_i + M)$. The resulting price is $pV_m/(\Sigma V_i + M)$. Now, the price of education per pupil relative to the price of non-school outlays per capita can be found and this reduces neatly to

$$\frac{nV_m}{\Sigma V_i + M} \div \frac{pV_m}{\Sigma V_i + M} = \frac{n}{p} \qquad (6.4)$$

Thus n/p is the price of per pupil spending relative to per capita, non-school spending. This has some intuitive appeal since it says that the higher the student content of the population, the higher are school prices relative to non-school prices.

This pupil content variable could enter the demand function as one measure of the prices of related goods, but there are problems associated with it. First, there will likely be a higher correlation between the price of education and student content since the number of students is in the numerator of both terms ($\frac{nV_m}{\Sigma V_i + M}$ vs. $\frac{n}{p}$). In fact, this relationship is strong and is highly significant ($r = 0.681$) giving rise to problems of multicollinearity. Secondly, from the collective choice view, the expected sign of student content is ambiguous. On the one hand, higher school prices relative to non-school prices should, ceteris paribus, result in lower school spending, to the extent that relative prices are measured. However, student content lends itself to another interpretation, which relates to the preferences of the voters in question: the higher the student content, the greater the likelihood that the median household has one or more students in the school system, and consequently, the greater the support the median household is likely to have for education. In short, opposite signs are predicted by the alternative views of the variable and it will not be employed here.

B. Empirical Estimation

Using two samples of Connecticut towns, the author estimates the following model based on Equation (6.1)

$$\ln E_i = \ln k + \alpha \ln P_i + \beta \ln I_i + \gamma \ln Y_i + \mu_i \qquad (6.5)$$

where E_i is local per pupil spending in town i; P_i is the tax price facing the median voter in town i and is derived from the expression $s_i V_m^i / E_i$; I_i is median family income in town i; Y_i is the median level of education in town i achieved by males 25 years and older; and μ_i is a random disturbance term with mean zero and variance σ_μ^2. Data on housing values, income, and years of schooling are drawn from census figures.[89] School tax and spending data for the 54-town sample are the same employed in the previous chapters. For the larger sample, consisting of 133 towns, local school taxes and spending data are drawn from the Governor's Commission on Tax Reform.[90] This larger sample could be used because data limitations were not as restrictive as they were in the capitalization study.[91]

Expected hypotheses are fairly straightforward. The lower the price of education facing the median voter in the town, the greater the quantity of education demanded (i.e., $\alpha < 0$). The higher the income of the median voter, the greater the quantity of education demanded ($\beta > 0$). Finally, the greater the education level of the median voter, the greater the demand for education ($\lambda > 0$). Income and the years of schooling are likely to be strongly related giving rise to problems of multicollinearity. Because of this, the model will be estimated both with and without the years-of-schooling variable.

The results of least-squares estimation of Equation (6.5) for the two samples are presented in Table 6.1 (with t-statistics below each estimate). All variables have the predicted sign and all are significant at the .005 level or better. The price elasticity of demand is relatively low, but its value is stable, remaining the same with or without the schooling variable. The value of the price elasticity term is slightly smaller in the larger sample. As might be expected, the income elasticity of demand is higher in those equations without the years of schooling. In each sample, the schooling variable draws down the income elasticity term from unity or above to 0.70. The education variable is slightly above or slightly below unity depending on the sample, suggesting that a ceteris paribus increase in the median voter's education level of 10 percent is associated with an increase in per pupil spending of roughly 10 percent. Although the price elasticity appears low, these results are consistent with the research of Akin and Young Day who found a value of -0.189 for a sample of

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[89]Department of Commerce, Bureau of Census, 1970 Census of Housing and 1970 Census of Population (Washington, D.C.: U.S. Government Printing Office, 1972).

[90]Local Government: Schools and Property (Hartford: The Governor's Commission on Tax Reform, II, December 1972).

[91]Census data limitations still eliminated some of the very richest and very poorest towns from the sample. Data on the smallest towns were simply not available and reported housing values in the very richest towns did not exceed $50,000, so that tax prices could not be computed. Both samples are listed in the Appendix.

TABLE 6.1

DETERMINANTS OF THE DEMAND FOR EDUCATION

Coefficient of:	Small Sample		Large Sample	
Constant	-5.439*	-3.649	-3.256	-2.345
	(-3.250)	(-2.176)	(-3.096)	(-2.194)
Price	-0.309	-0.301	-0.248	-0.250
	(-4.186)	(-4.377)	(-4.997)	(-5.185)
Income	1.234	0.700	1.026	0.707
	(6.969)	(2.844)	(9.275)	(4.621)
Schooling		1.296		0.836
		(2.928)		(2.926)
R^2	0.533	0.601	0.418	0.455
F	29.18	25.20	46.74	35.82

*All variables are significant at the .005 level or better.
(The numbers in parentheses are the t-statistics.)

New York towns[92], and Barlow, who found a price elasticity of -0.34 for an interstate sample.[93]

Implicit in the view of past court decisions has been the sentiment that school finance reform should target on lowering the price of education to towns confronting higher prices. It is therefore a policy interest whether towns facing higher prices for education are any more or less responsive to price changes than other towns. To examine this, the larger sample was divided in half based on the price of education: towns facing higher prices and towns facing lower prices. Ordinary least squares were then estimated for the two samples and the results were as follows:

	Elasticities (t-statistics)			R^2	F
	Constant	Price	Income		
Low-priced towns	-1.071 (-0.630)	-0.236 (-2.176)	0.793 (4.504)	0.264	11.50
High-priced towns	-4.747 (-3.585)	-0.296 (-2.381)	1.182 (8.508)	0.538	37.24

Based on the above results, high-priced towns appear somewhat more sensitive to both price changes and income changes, but the price elasticity is still relatively low. The model does a better job at explaining per pupil spending in the high-priced towns.

C. Price and Income Effects

The derived price and income elasticities can now be employed to give us some idea of how effective alternative State funding policies will be in generating higher levels of per pupil spending. Assume that in a particular town facing a high price for education, school spending is $500 per pupil, with an average of one student per home. Assume the State now introduces a program designed to increase that town's effective tax base enough so as to cut the price facing the median voter in half. With a price elasticity of -0.30, a 50 percent price reduction will result in a 15 percent increase in per pupil spending to $575. This is hardly a dramatic rise in spending for such a drastic cut in the price. The State's share of the tax bill is $287.50 per pupil, and the local share is the same. Note that only a portion of State aid goes toward new school spending, the rest is absorbed either by other public outlays or by tax reductions.

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[92]John S. Akin and Douglas J. Young Day, "The Efficiency of Local School Finance." Review of Economics and Statistics, 57 (May 1976), pp. 255-258.

[93]R. Barlow, "Efficiency Aspects of Local School Finance." Journal of Politicial Economy, 78 (September/October 1970), pp. 1020-1040. See also, W. N. Grubb and S. Michelson, States and Schools (Lexington: Lexington Books, 1974). These researchers also attempted to estimate something resembling this author's price elasticity figure, but their results were ambiguous and difficult to interpret.

If, rather than lowering the price, the State simply awards this town a lump sum grant amounting to $287.50, what would be the impact of this aid on per pupil spending? If the median voter is permitted unrestricted substitutions in his consumption bundle, then he will view this lump sum grant as simply an increase in his income,[94] and the impact on school spending will depend upon his income elasticity of demand for education.

In 1970 in Connecticut towns, school taxes represented about three to four percent of median family income. This information, coupled with the fact that the income elasticity of demand for school spending is around 0.70, provides enough information to calculate the increase in school spending. If local governments receive on the average $287.50 per pupil, then school spending will increase by (.04 x .70 x 287.50) about $7.50 or only about one-tenth the amount produced through price reductions. While price changes are more effective than income changes, in neither case is the State grant program having much of an effect on the level of per pupil spending. The State could attempt to require that the aid be spent on education; but as long as the aid is less than the total amount the town would spend on its own, then the town will make substitutions in the budget.[95]

In view of these relatively modest price and income effects, recent concern of teachers about local use of State aid to education is not surprising. For example, the town of Waterbury is being sued primarily by teachers because town officials are using State aid-to-education funds to "balance the budget" rather than spending the money on education.[96] A similar case is in the courts in Bridgeport. The Governor, in view of the developments, predicts that more State influence will be employed in controlling how state aid is spent.[97]

D. Summary

The results concerning the price elasticity of demand for education are not particularly encouraging for the effectiveness of school finance reform. Even dramatic changes in the price of education appear unlikely to elicit equally dramatic changes in school spending. The evidence suggests that

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[94]John C. Weicher, "Aid, Expenditures, and Local Government Structure." National Tax Journal, 25 (December 1972), pp. 273-284.

[95]This is analogous to giving a family $5.00 a week and requiring them to spend it on groceries. If the grocery budget was already $25.00 a week, then the $5.00 will not likely lead to much of an increase in spending. They will simply spend less of their own money on groceries. However, if the grant is $50.00 a week to be spent on groceries, then spending will obviously double. Of course, the family and the town would prefer having the money with no strings attached.

[96]"Grasso Predicts More State Influence in Running Local Schools." The Hartford Courant (Thursday, June 23, 1977), p. 20.

[97]Ibid.

differences in income across towns explain a larger share of the differences in per pupil spending across towns than is explained by differences in the price of education. For example, if the price of education in one town is twice that in another town, ceteris paribus, school spending in the high-priced town will be only about 12 percent less than in the low-priced town. However, if family income in one town is, on the average, only half that of another town, then school spending in the poorer town will be 35 to 50 percent lower, based on the range of income elasticities derived earlier.

In view of this, it appears doubtful that education spending will be equalized even if the price of education facing the median voter in each town were equal, for income differences across towns would still result in differing demands for education.[98] It is not clear how, short of full State funding, equalized funding could be achieved. Of course, along with full State funding will go the loss of local choice and also individual choice in selecting a town with the most preferred tax-expenditure mix.

This chapter has been concerned primarily with efficiency questions surrounding the demand for education and the likely effectiveness of school finance reform. The next chapter addresses equity issues involved in the current system of school funding, and the following chapter examines the recent school finance reform bill in Connecticut.

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[98]The only instance in which income would not be important would be if the income elasticity of demand for education were zero. Based on the results in this chapter, this hypothesis is rejected with a high degree of confidence.

CHAPTER 7

SOME EQUITY IMPLICATIONS OF SCHOOL FINANCE

State school finance reform, to date, has been developed with an implicit assumption that because of the low tax base in some towns, these towns pay a higher price for education and this price tends to be higher in low-income towns. These relationships will be examined in this chapter. With the exception of *Rodriguez v. San Antonio*, any judicial discussion of the distribution of income and tax prices within a town has been ignored. These distributions, as will be shown, may have an important effect on the ultimate impact of school finance reform. In this chapter, the relationship between a number of variables within and across towns will be examined. All comparisons will be based on simple correlation coefficients between paired variables in the 133-town sample employed in the previous chapter. This type of analysis does not hold other factors constant and is not meant to imply the direction of causality. All correlations, unless otherwise stated, are significant at the .01 level of significance or better. A complete correlation matrix may be found in Appendix C.

A. School Tax Incidence

Since fiscal differences across towns become capitalized, the question of tax incidence becomes less meaningful. In a town where citizens pay more for public goods than other towns, home values should be lower, ceteris paribus. In spite of its limited normative appeal tax incidence, per se, is often raised in the discussion of school finance reform and will be considered here as well.

The usual procedure in tax incidence studies is to examine the taxes that each income group pays as a percentage of income. Based on these results one makes inferences concerning the tax structure's regressivity, proportionality, or progressivity. Such analysis usually assumes that the public goods provided are available to all, so the tax incidence represents an implicit price of the good as a percentage of income. However, each town provides a different level of per pupil spending, so it becomes less relevant to observe school taxes as a percentage of income.

Perhaps the best proxy for incidence where benefit levels differ is the tax-price derived earlier. The tax-price indicates the tax dollar paid by the median household for each dollar of per pupil spending provided in the town. The relationship between this tax-price and the median income levels across towns uncovers any link between income and price. Although such a relationship has not been examined before, the conventional wisdom in this area suggests that poor towns face a higher price for education than rich towns. An examination of the 133 Connecticut towns in the sample indicates a positive and significant relationship between median family income and the tax-price of education paid by the median voter in that town. Thus, median homeowners in high-income towns tend to pay more for each dollar of per pupil spending than those in low-income towns.

The situation across towns is analogous to the situation within a town. If a positive link between family income and the value of housing within a town is assumed, then it is true that high-income families pay a higher price for education than low-income families. Hence, both across towns and within towns, high-income families tend to pay higher prices for each dollar of per pupil spending.

As noted earlier, the usual procedure with tax incidence studies is to view taxes paid as a percentage of income. For each town in the sample, the effective school tax rate was multiplied by the median value of housing in the town to yield the school taxes paid by the median homeowner. This term was divided by the median family income in the town to produce taxes as a percentage of income, the traditional measure of incidence. This incidence measure was then correlated with some other characteristics of the town. Perhaps of most interest is the relationship between tax incidence and median income; the higher median family income was in the town, the higher school taxes were as a percentage of income. Thus, the school tax is progressive across towns (although it is important to note that a high-income town tends to provide a higher level of education).

B. Income and Property Wealth

Court decisions thus far have shown concern that a town's ability to finance education is not so much a function of the town's property tax rate but the town's property wealth. Towns with greater property wealth per pupil are viewed as able to buy education for a lower "price." Implicit in judicial discussion is that towns with low property wealth are also poorer towns with respect to income. Therefore, it has been argued that poor people faced a higher price for education.[99]

There have been few attempts to document the actual relationship between per pupil property wealth and family income across towns. Studies of school districts in California[100], Washington[101], and Texas[102] have found no clear relationship between per pupil wealth and median family income in the town. This lack of a clear relationship results partly from the fact that older urban areas still retain the commercial and industrial tax base that initially led to higher per pupil wealth, but most higher-income residents have long since moved to the suburbs. Moreover, central cities tend to have a smaller ratio of students to total population and this

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[99]See *Rodriguez v. San Antonio* and *Serrano v. Priest*.

[100]M. Cox, "Equality in Educational Finance: An Analysis of the Distribution of Taxes and Educational Benefits by Districts." Ph.D. dissertation, University of Southern California, 1975.

[101]W. R. Andersen, "School Finance in Washington: The Northshore Litigation and Beyond." Washington Law Review, 50 (1976), pp. 853-900.

[102]See *Rodriguez v. San Antonio*.

results in greater property wealth per pupil. For this sample, the relationship between property wealth per pupil and median family income is positive; but with a correlation coefficient of only 0.258 it is relatively weak.

Perhaps of more relevance in judicial thinking is the relationship between family income and the price of education paid by the median voter derived earlier. The correlation coefficient indicates that the price of education tends to be higher in high-income towns.

C. Distribution of Prices and Incomes Within Towns

The methodology employed so far has been to focus on the price confronting the median voter. Of course, prices within a town vary with the variation in property values. In fact, the distribution of housing values will reveal the underlying price distribution within the town and will also convey information about the likely beneficiaries of property tax capitalization resulting from property tax reform. An examination of the distribution of family incomes within a town can shed light on the homogeneity or heterogeneity of families within a town. This has important policy implications because one might choose a different reform scheme to deal with a homogeneous town than with a heterogeneous town.

There is a way of examining just how representative the median valued home and the median family income are of home values and family incomes in a particular town. A measure that conveys information about how representative these median values actually are is the Gini coefficient. Gini coefficients of concentration for homes and for property values have been calculated for each of the 133 towns in the sample based on the distribution of homes and property valuations of families in each town.[103] Since in all but one town the school district conforms perfectly to the town, town data are identical to school district data. For each town, income groups were sorted into 15 income intervals and housing values were sorted into 11 intervals. Based on these intervals, two Gini coefficients were calculated for each town: a family income Gini and a property-value Gini. Both are measures of concentration or homogeneity of income and property values within the town. The lower the value of the Gini, the greater the homogeneity.

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[103]These calculations were undertaken and provided to the author by Kent Portney, formerly a graduate student at the University of Connecticut. Using these data, Portney had done some statistical work (see Bibliographic Reference No. 60), but the very wealthy towns should have been omitted from his sample because median housing values above $50,000 are simply not provided by the Census Bureau. Hence the Gini coefficient for home values derived by Portney for these towns are misleading and were not used in the present calculations. The exact methodology was developed by the Census Bureau (see Bibliographic Reference No. 70).

Gini coefficients were compared with one another and with other characteristics of the town to uncover any significant relationships between, for example, income homogeneity and the level of income in the town. The results indicate first that towns that are homogeneous with respect to incomes also tend to be homogeneous with respect to property values. This is not surprising in view of the strong link across individual families between income and the value of housing. With respect to median family income there is no apparent relationship between median family income in a particular town and income homogeneity in that town; high-income towns seem to have income dispersions similar to low-income towns. If the relationship between the percentage of population that is below the poverty line and the homogeneity of income is viewed, poor towns are significantly less homogeneous. There is weak negative relationship between the income level and the property Gini, suggesting that higher-income towns tend to be more homogeneous with respect to housing values, but this relationship is not statistically significant. Turning to the median value of homes within a town, towns with higher home values show greater variability of income. However, there is no significant relationship between median housing values and the variability of housing values within a town.

Tax-Price and Homogeneity. There is a clear and significant relationship between the price of education, as defined earlier in this study, and both income and housing value homogeneity. Towns facing higher tax prices for education tend to be more homogeneous with respect to both income and housing values. The positive link with housing value homogeneity indicates that families in high-priced towns tend to face more uniform prices across households than do families in low-priced towns. If it becomes the objective of school finance reform to lower the price in the high-priced towns, then the benefited group will tend to be more homogeneous with respect to income; because housing values are more homogeneous in these towns, these residents will experience relatively similar capital gains. If the low-priced towns, at the same time, experience capital losses as a result of the reform, then the losers will be more widely distributed than the winners in the high-priced towns in terms of both family income and resulting changes in housing values.

School finance reform, thus far, has not addressed explicitly the price of education across towns as defined in this study, but employs the market value of property per pupil as a proxy for price. Therefore, the relationship between this measure of tax-raising ability and homogeneity will also be observed. In view of the relationship between price and homogeneity, market value per pupil is related to homogeneity in the expected way; towns with a higher value of property per pupil are, on average, less homogeneous in terms of incomes and housing values than towns with lower property wealth per pupil. Consequently, the discussion above concerning price variability and capitalization variability with regard to price holds with respect to market value per pupil as well.

CHAPTER 8

SCHOOL FINANCE REFORM IN CONNECTICUT: 1977

In response to the State Supreme Court's decision in *Horton v. Meskill* the General Assembly in the closing minutes of the 1977 session passed a modestly funded school finance reform bill.[104] The reform measure, though a result of compromise, is weighted heavily toward aiding the central cities. The bill is designed to raise, over time, the taxing ability of all towns to the 85th percentile of all towns, but present funding of 20 million dollars covers less than 10 percent of what it would cost to do this. In this chapter, the allocation formula will be reviewed and compared with the more traditional power-equalization formula. The impact of the bill in terms of changes in school spending and in property values will also be discussed.

A. The Formula

The allocation formula of this "compromise" bill is as follows:

$$S_{i,t-2}\left(\frac{MV^*}{P^*}\cdot\frac{I^*}{I_s}-\frac{MV_i}{P_i}\cdot\frac{I_i}{I_s}\right)\left(N_i+\tfrac{1}{2}A_i+\tfrac{1}{2}P_i\right) \qquad (7.1)$$

where $S_{i,t-2}$ is the school tax rate in town i two years prior to the year in question. $\frac{MV^*}{P^*}\cdot\frac{I^*}{I_s}$ is the "adjusted equalized net grand list per capita" for the town in the 85th percentile based on this measure of wealth. The first term, $\frac{MV^*}{P^*}$, is simply the market value per capita and the second term, $\frac{I^*}{I_s}$, is the median family income for the town in the 85th percentile divided by the State median family income. Hence the property base per capita is adjusted by the relative income in the town. $\frac{MV_i}{P_i}\cdot\frac{I_i}{I_s}$ represent the same variables for the ith town. Thus the first set of parentheses shows the difference in the adjusted property base between the town ranking in the 85th percentile and towns below this level. The second set of parentheses enclose what will be referred to as the multipliers, that is, the units by which the tax rate times the difference in property base are multiplied to yield the town's share of State aid.[105]

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[104] An Act Concerning Education Equalization Grants. State of Connecticut (1977), Public Act 77-579. Actually there were several bills concerning funding, reassessment procedures, and the bill itself.

[105] Of course, since funding is far below requirements Equation (7.1) yields an amount that will be used to calculate the fraction of existing aid that will go to the town.

N_i is the number of students enrolled, A_i is the number of children in the town receiving aid under the Federal Aid to Dependent Children program, and P_i is population. The above formula differs sharply from the usual power equalization formula, which is simply the school tax rate for the year in question times the difference in property wealth per pupil times the number of pupils. The implications of this formula will be analyzed for changes in the price and quantity of education. The ultimate beneficiaries of reform will also be examined. Although the reform program is now funded at a low level, the discussion will assume that the funding level will adequately support the program.

The School Tax Lag. Because there is a two-year lag in the school tax rate employed in the formula, State aid received by the town in a given year will be unrelated to the current choice of school tax rates. What may happen is that State aid will be viewed more as a lump sum grant than a grant designed to change the price of education. Since the grant received this year has nothing to do with the currently chosen level of tax effort, the taxes are more likely to be set with the views that State aid is exogenous, or a given in the system. If State aid is simply viewed by the town as a lump sum grant, there will be no price effect. In Chapter 6 the lump sum grant was much less effective in stimulating additional school spending than grants designed to change the price of education.

Of course, if the allocation formula becomes firmly set and appears likely to continue for years, then, over time, voters should come to realize that the tax rate selected this year will affect the school aid received two years hence; the higher the tax rate selected, the more aid in two years. Under these circumstances the price effect may eventually take hold. Recent events, however, tend to underscore the tentative nature of current legislation. The Connecticut School Finance Advisory Panel has been formed to make recommendations to the Legislature concerning the extent and nature of school finance reform. Few believe that the formula adopted in the compromise bill will remain in force for long. To repeat, the more temporary the bill appears to be, the more likely the aid program will be viewed as a lump sum grant rather than a matching grant, and the less likely this aid will stimulate school spending.

Of course, even if the reform has a pure price effect, the evidence in Chapter 6 suggests that only a fraction of total aid will ultimately go into higher school spending. In addition, the low price elasticity found earlier is a poor prediction for the use of standard policies in equalizing education spending.

B. The Price of Education

How does this formula relate to the price of education facing the median homeowner in each town, and how does this relationship compare with that derived when employing the traditional guaranteed tax base formula? Each component of the formula will be analyzed in turn and related to the price of education. Analyses are based on simple correlation coefficients in the 133-town sample and are not intended to imply causality.

First, with respect to the school tax rate, towns with higher school tax rates also have significantly higher prices for education. Therefore, if more aid goes to towns with higher school tax rates, more aid is going to towns facing higher prices for education. Since the school tax rate is common to both the Connecticut formula and the more traditional power-equalization formula, neither formula is superior in this regard.

The property wealth per capita is related to price in the expected way: towns with higher wealth per capita face lower prices for education. However, the relationship between the two is much weaker than the relationship between price and the traditional measure of wealth, property wealth per pupil ($r = -0.355$ vs. $r = -0.720$). Consequently, substituting per capita wealth for per pupil wealth undermines the basic relationship between school aid and the tax price of education; as a result, it is less likely the case that State aid goes to the towns facing the higher price for education. Adjusting the property base per capita by relative income in the town further undermines the objective of providing greater relief to towns with a higher tax-price for education because median family income and tax-price are positively related.

In discussing the "multipliers" (i.e., those numbers by which the tax rate times the difference in base is multiplied), it is found that population is negatively related to price, so that more populous towns tend to face lower prices. The same holds for the relationship between the measure of poverty and price. Towns with a higher percentage of poor residents tend to have lower prices for education. If aid goes to more populous towns with a greater percentage of poor, this aid is going to towns that, on average, face lower prices for education.[106] Finally, with respect to students, towns with a higher ratio of students as a percentage of the population, face higher prices for education. Therefore, for a given population, the higher the student content, the higher the price and the more likely school aid will be directed to towns confronting higher prices.

The traditional grant formula is as follows:

$$S_{it} \left(\frac{MV^*}{N^*} - \frac{MV_i}{N_i}\right) N_i \qquad (7.2)$$

All variables are as previously defined. In comparing the Connecticut formula with the traditional approach, in no respect does the State formula improve on the link directing school aid to towns facing higher prices. In fact, each change only weakens this relationship: property wealth per capita is less related to price than is property wealth per pupil;

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[106]This stems largely from the fact that central cities tend to have more poverty but, because of commercial property and a low ratio of students to population, also a lower price.

population and the measure of poverty are inversely related to price; and the number of students remains as a multiplier, but its effects are diluted by the addition of the other two terms.[107]

C. Low-Income Towns

If the effect of aid on high-priced towns per se is ignored and the objective of school aid is viewed as lowering the price of education to members of income-poor towns, the State formula performs more favorably. First, while the traditional measure of wealth, property wealth per pupil, is positively related to median income across Connecticut towns, this relationship is improved when wealth per capita is employed (from 0.258 to 0.479). Therefore, the towns receiving the most aid will tend to have lower median family incomes, indicating that adjustment for income differences obviously favors the poorer towns. More populated towns and towns with a larger percentage of poor also tend to be poorer with respect to median family income. Thus, entering these elements as multipliers favors poorer towns. Moreover, towns with a higher student content in the population tend to have higher median incomes, so diluting students as a multiplier by population and poverty figures directs more funds towards low income towns.

The State reform program is more tailored to lower the price of education to poorer towns, but not necessarily those towns facing the highest prices. Indeed, central cities in the State's five Standard Metropolitan Statistical Areas all have prices for education that are below the State average, but rank low in terms of income. Of course, under the present reform formula it seems doubtful that State aid will be viewed as a price-changing mechanism at all, but will be regarded simply as a lump sum grant which can be used to finance education, other public services, or to lower taxes. Therefore, dramatic rises in school spending as result from the recent reform should not be expected, even when funded at a more adequate level. Although the reform measure is billed as a school finance reform package, it is more a vehicle to channel more State funds to poor towns, particularly the central cities. While this effort may be worthwhile, it is mislabeled.

D. Capitalization Effects of Reform

At present, school finance reform in Connecticut is in the state of flux, and because of this uncertainty it is less likely that the particular formula now in effect will result in immediate and complete fiscal capitalization. But if the present aid formula is adopted as a long-term reform, if the population believes that it will continue indefinitely, and if the reform is adequately funded, what capitalization effects are likely to occur?

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[107]For the 133 towns, pupils represent on average about 20 percent of the population. Hence in the State formula since 1/2P is a multiplier this constitutes a figure that is more than double the student figure. As a result, students are less than one-third as important as a multiplier in the State formula than in the traditional formula.

In general, property owners in towns receiving aid will benefit; those in other towns will not benefit and may even suffer capital losses. The distributions of benefits and losses within towns will depend upon both the distribution of home values and how State aid is used. The State aid formula recently adopted tends to help lower-income towns. There is no particular relationship between median family income and the distribution of properties within the town. Low-income towns appear to have about the same degree of homogeneity (or heterogeneity) as high-income towns. Thus, in poorer towns there is a distribution of winners and in richer towns, a similar distribution of losers. No doubt, across towns there will be individuals with comparable incomes, but who will reap capital gains in the poor towns and perhaps suffer capital losses in the rich towns. Thus, there will likely be some horizontal inequity.

From Chapter 2 it is concluded that the greater the increased school spending resulting from school aid to the town, the greater will be the benefit received by owners of the lower-valued homes. On the contrary, the more that State aid simply turns into lower taxes, the more likely capital gains (as a percentage of the value of homes) will be proportional across properties. Based on the current State formula and based on the relatively low price elasticity of demand derived earlier (particularly for the low-priced towns and central cities), it appears unlikely that much of the school aid will result in higher per pupil spending. Most of the aid will be used to relieve the property tax burden and, perhaps, finance other public goods. With little aid going to increased school spending, property appreciation will tend to be proportional across homeowners. Of course, commercial and industrial properties in these towns will benefit as well.

Impact on Renters. Often, the poorest members of any town will be renters.[108] There is little in the reform package that is attractive to them. Since renters own no property, they will not experience the windfall gains in property values. Moreover, because of the low price elasticity of demand for education, there will be little change in per pupil spending. Indeed, there is evidence that even if spending goes up as a result of State aid, the renter could wind up paying for it through higher rents. Moreover, if the aid program is financed through a regressive tax, these renters would probably be worse off after the reform. In any event, it is the owners of these rental properties who will be the primary beneficiaries of reform. To the extent these owners are higher income residents, then windfall gains will most benefit higher income families.

Property values in towns with higher median family incomes are likely to decline or at least not appreciate as quickly if State aid is not received. The demand for property in these towns will decline for two

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[108]Based on census data less than 10 percent of the minorities living in Connecticut's central cities are in owner-occupied housing. This compares with 60 percent for the State as a whole. (See Bibliographic Reference No. 14).

reasons: first, local taxes will likely rise; second, other towns, as a result of reform, will become more fiscally attractive. These towns will likely receive less State aid than they otherwise would. This will mean a greater local tax effort and possibly less school spending. The higher taxes and lower spending will become capitalized and result in lower property values. If other towns become more fiscally attractive after reform, the demand for property in the higher-income towns will decrease, to some extent, again leading to lower property values.

If these high income towns respond to the loss of State aid by simply increasing their own tax effort, then capitalized losses will tend to be proportional across properties; but if these towns cut school spending, then lower-valued homes will suffer greater proportional losses in property values. Renters in high-income towns will be less harmed than property owners, since renters are not locked into the asset (unless renters have to live in a particular town). Tax increases will not likely be passed on and reductions in school spending may result in lower rents (since renters can always move to towns with higher school spending).

The wealthy towns of southwestern Connecticut are somewhat unique and deserve special consideration. These towns are unique not so much because of their attractive fiscal position (on the contrary, these residents face higher tax prices for education than does the average town in the State), but because of the environment and the proximity to New York City. As a result, even if other towns became more attractive because of school finance reform, the effect on the demand for housing in the wealthy towns would be negligible because these other towns are simply not close substitutes. Also, if the reform were financed through a progressive income tax, there would be little effect on the demand for housing in these towns, since the tax is unrelated to the town of residence.[109] However, if a "recapturing" scheme were used (i.e., taking property tax dollars from the rich towns and turning them over to the poor towns), property values would tend to fall or, at least, not increase at as fast a rate.

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[109]Of course, there may be some decrease in demand as residents find other states now relatively more attractive.

CHAPTER 9

CONCLUSIONS

In a world in which tax and expenditure differences across towns are capitalized into the value of property, there can be no horizontal inequity. Any fiscal advantage homes in one town have are negated through higher prices and homebuyers at the margin will become indifferent between otherwise identical homes. In view of capitalization, comparisons of tax burdens across towns lose some of their normative significance. To say that taxes are higher in one town than in another does not necessarily mean that residents of the low-tax towns are better-off; perhaps original property owners in the low-tax towns received windfall capital gains, but over time new entrants have paid for their lower taxes through higher property prices.

Tax and expenditure differences across towns explain just a portion of differences in home values across towns. Towns may have unique, geographical situations, such as the towns in southwestern Connecticut, or towns may have expensive homes simply because less expensive homes are outlawed. In short, even aside from fiscal differences, some towns are simply more attractive than other towns and a higher family income is necessary to support homes in these towns. Because of differences in the commercial and industrial property tax base, the high-income towns are not necessarily the towns with the highest property base per pupil. Indeed, confusion on this point has led to the misguided view that differences in the property base and resulting price differences are the prime reason for spending differences across towns.

Robert Bish notes that the advent of school finance reform decisions in the courts represents the first instance in which all residents of a jurisdiction were viewed as a "suspect class," because of a low property base per pupil and the presumed higher price for education in these towns. Bish states that " ... never had the concept of suspect classification been applied to the heterogeneous residents of a government jurisdiction."[110] This approach has been true in Connecticut as well. In the recent Connecticut Supreme Court decision of *Horton v. Meskill*, the Court argued that

> The wide disparities that exist in the amount spent on education by the various towns results primarily from the wide disparities that exist in the taxable wealth of the various town....more educational dollars will be allotted to children in property-rich towns.[111]

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[110]Robert L. Bish, "Fiscal Equalization Through Court Decisions: Policy-Making Without Evidence." In the Delivery of Urban Services: Outcomes of Change, Elinor Ostrom (Ed.), Sage Urban Affairs Annual Review, 10 (1972), pp. 75-102.

[111]*Horton v. Meskill*, p. 2510-2511.

Although the Connecticut Supreme Court did not make specific recommendations, equalizing the effective property tax base has been viewed favorably as a means of ensuring greater equality in education.

This analysis indicates that greater property wealth per pupil results in a lower price for education, and this lower price in turn leads to greater per pupil spending. To credit property base differences and the underlying price differences as the primary source of spending disparities across towns is simply incorrect. The evidence suggests that income differences across towns are more important than price differences. For example, if the median homeowner in one town faces a price for education that is only half that faced by the median voter in another town, the low-price town will spend only about 15 percent more on education, ceteris paribus. However, if family income in a town is, on average, double that of another town, then the high-income town will spend from 70 to 100 percent more on education. Hence, income differences appear more important than price differences.[112] Even if prices were equalized across towns, wide differences in income would remain, and these would perpetuate differences in school spending.

The real issue of school finance reform is not the differences in the price of education across towns; indeed as shown, the price is higher in high-income towns. The real issue is not the incidence of school taxes across towns, for families in high-income towns tend to pay a higher fraction of their income for education. What is at issue is how to provide for "equal opportunity of education," when incomes and resulting abilities to pay differ so dramatically across towns. To complicate matters even more, the high-income towns tend to pay a higher price for each dollar of per pupil spending. Finally, how does one address the fact that each town is not a homogeneous group, but a distribution of individuals with different incomes and different tax prices?

One option open is full State funding at some specified levels for each town. This would equalize school spending, but it would also bypass local choice in determining the level of spending. Also, it would eliminate individual choice in choosing a town (as would Tiebout[113]), based on the bundle of taxes and spending. This would set off a whole chain of capitalization effects.

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[112]As an example, the high-income towns of southwestern Connecticut spend about 50 percent more per pupil than the average town in the State. Yet the price for each dollar of per pupil spending in these "rich" towns is higher than the average price for the State. Thus, this higher spending is not due to a lower price of education in these towns (since prices are actually higher on average), but to higher income levels. Perhaps there are also differences in the taste for education as reflected, for example, in the higher level of education achieved by voters in these towns.

[113]Tiebout, "A Pure Theory," pp. 416-424.

As is often the case, this research raised more issues than it answered. School finance reform is not a simple issue and it should not be viewed simply as a process of taking money from the rich and giving it to the poor. The present school reform bill in Connecticut is so far removed from the price of education that it should not be viewed as a school finance bill at all, but as a vehicle for delivering more State funds to the majority of Connecticut towns. These towns are populated by both high and low income individuals. In fact, the central cities have a wider distribution of incomes than do other towns in the State. The evidence here suggests that it is the higher-income households in those towns who will be the primary beneficiaries of reform. One might ask why certain high-income individuals should benefit at all when households of similar incomes in other towns do not. Since capitalization ensures horizontal equity, why are they now treated differently?

Perhaps more important than capitalization considerations is the education of the children in these towns. The evidence here suggests that school finance reform now under way in Connecticut will have no major effect on per pupil spending even if funded more adequately.

APPENDIX A-1

SMALL SAMPLE OF CONNECTICUT TOWNS

Urban		Rural	
Bethel	West Haven	Bolton	Plainfield
Bloomfield	Windsor	Brooklyn	Redding
Branford	Windsor Locks	Canterbury	Salisbury
Burlington	Wolcott	Canton	Southbury
Cheshire		Chester	Sprague
Cromwell		Clinton	Suffield
Ellington		Durham	Thompson
Milford		East Granby	Washington
Monroe		East Hampton	
North Branford		Essex	
Orange		Griswold	
Prospect		Harwinton	
Rocky Hill		Lebanon	
Shelton		Litchfield	
Thomaston		Madison	
Trumbull		Mansfield	
Vernon		Montville	
Wallingford		New Hartford	
Watertown		North Stonington	
West Hartford		Old Lyme	
		Old Saybrook	
		Oxford	

APPENDIX A-2

LARGE SAMPLE OF CONNECTICUT TOWNS

Ansonia
Avon
Beacon Falls
Berlin

Bethany
Bethel
Bloomfield
Bolton

Branford
Bridgeport
Bristol
Brookfield

Brooklyn
Burlington
Canterbury
Canton

Cheshire
Chester
Clinton
Colchester

Columbia
Coventry
Cromwell
Danbury

Deep River
Derby
Durham
E. Granby

E. Haddam
E. Hampton
E. Hartford
E. Haven

E. Lyme
Easton
E. Windsor
Ellington

Enfield
Essex
Fairfield
Farmington

Glastonbury
Granby
Griswold
Groton

Guilford
Haddam
Hamden
Hartford

Harwinton
Hebron
Killingly
Lebanon

Ledyard
Lisbon
Litchfield
Madison

Manchester
Mansfield
Marlborough
Meriden

Middlebury
Middlefield
Middletown
Milford

Monroe
Montville
Naugatuck
New Britain

New Fairfield
New Hartford
New Haven
Newington

New London
New Milford
Newtown
N. Branford

N. Canaan
New Haven
N. Stonington
Norwalk

Norwich
Old Lyme
Old Saybrook
Orange

Oxford
Plainfield
Plainville
Plymouth

Pomfret
Portland
Preston
Prospect

Putnam
Redding
Ridgefield
Rocky Hill

Salisbury
Seymour
Shelton
Simsbury

Somers
Southbury
Southington
S. Windsor

Sprague
Stafford
Stamford
Stonington

Stratford
Suffield
Thomaston
Thompson

Tolland
Torrington
Trumbull
Vernon

Wallingford
Washington
Waterbury
Waterford

Watertown
Westbrook
W. Hartford
W. Haven

Wethersfield
Willington
Winchester
Windham

Windsor Locks
Wolcott
Woodbridge
Woodbury
Woodstock

APPENDIX B

SOURCES OF DATA

1. U.S. Department of Commerce, Bureau of the Census, 1970 Census of Housing, Part 8, Connecticut, Washington, D.C.: U.S. Government Printing Office, 1972:

   Median Market Value, Median Contract Rent, Median Number of Rooms, Percent of Structures Built Since 1960, Percent of Rental Units with all Plumbing Facilities, Percent of Residents Residing in Owner-occupied Housing.

2. U.S. Department of Commerce, Bureau of the Census, 1970 Census of Population, Vol. 1, Characteristics of the Population, Part 8, Connecticut, Washington, D.C.: U.S. Government Printing Office, 1972:

   Median Family Income, Median School Years Completed by Males 25 Years Old or Older (For towns with population between 2,500 and 10,000, this variable is for "total persons 25 years old or older").

3. Johnston, Edward J., Jr., "Evaluation of Alternative Property Tax Systems to Reduce Disparity in Education Expenditures and Property Tax Rates Among Connecticut Towns." Ph.D. dissertation, University of Connecticut, Storrs, Connecticut, May 1975, (Unpublished Statistic Appendix):

   Effective Property Tax Rate, Effective School Tax Rate, Nonschool Tax Rates, Total Per Pupil Spending, Local Per Pupil Spending, State and Federal Aid Per Pupil, Average Property Base Per Pupil.

4. Map of Connecticut in Rand McNally Road Atlas, 43rd Ed., Chicago: Rand McNally and Company, 1967:

   Linear Distance in Miles from town to Nearest Metropolitan Area.

APPENDIX C

LARGE SAMPLE CORRELATION MATRIX*

	MVAL	MFI	MVPP	MVPC	IGINI	PGINI	POV	POP	STCON	INCID
TPRICE	.159	.290	-.720	-.355	-.411	-.310	-.325	-.270	.681	.806
MVAL		.857	.451	.586	.234	-.059	-.410	.043	.081	.259
MFI			.258	.479	.002	-.145	-.650	-.178	.223	.273
MVPP				.770	.582	.326	.032	.270	-.427	-.520
MVPC					.360	.246	-.285	-.061	.179	-.219
IGINI						.575	.397	.223	-.310	-.229
PGINI							.126	-.168	-.144	-.194
POV								.430	-.365	-.212
POP									-.393	-.155
STCON										-.090

*Significant values of r:
.05 significance level, r > .168
.01 significance level, r > .218

TPRICE = Tax Price
MVAL = Median Value of Owner-occupied Housing
MFI = Median Family Income
MVPP = Market Value of Taxable Property Per Pupil
MVPC = Market Value of Taxable Property Per Capita
IGINI = Gini Coefficient of Concentration of Family Incomes
PGINI = Gini Coefficient of Concentration of Housing Values
POV = Percentage of Population with Incomes Below the Poverty Line
POP = Population
STCON = Students as a Percentage of Total Population, Student Content
INCID = School Taxes of Median Homeowner as a Percentage of Median Family Income

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